United States Department of Agriculture

Forest Service

Medicine Bow-Routt National Forests

Laramie, Wyoming

April 2018

Wildlife Biological Assessment Report

Landscape Vegetation Analysis

Medicine Bow National Forest

Steve Loose *04/23/2018*

[Steve Loose, wildlife biologist] **Date**

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SUMMARY

Canada lynx is the only threatened or endangered species affected by the LAVA project. Proposed actions could occur in 13 LAUs and the Snowy Range and Northgate linkage corridors. Vegetation management will occur in currently unsuitable habitat, nonhabitat, and suitable lynx habitat in the LAUs. Vegetation management will utilize exemptions and exceptions to the vegetation management Standards in the Southern Rockies Lynx Amendment (USDA 2008). LAVA project will use 13,214 acres of exemptions (39.7% of the remainder), 3978 acres of the 1% precommercial thinning exceptions (32.7% of the remainder), and 2893 acres of the exception for incidental damage to winter snowshoe hare habitat (50% of the remainder). With extensive use of exemptions and exceptions to the Standards, it is anticipated that "some adult female lynx within home ranges affected by such projects may fail to complete a pregnancy or would be less successful in finding adequate food resources needed to ensure maximum survival potential for kittens", impairing reproduction and kitten survival (UDSI 2008, p.76). The LAVA project "may affect," and is "likely to adversely affect" Canada lynx.

REGULATORY FRAMEWORK

Federal Laws and Regulations

This biological evaluation report (BE) conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

Forest Service Direction

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3).

Forest Plan Direction

Analysis in this Biological Assessment will address direction provided in the Southern Rockies Lynx Amendment (SRLA) (USDA 2008).

ANALYSIS METHODOLOGY

LAVA project Issues and Alternatives identified analysis indicators as the four vegetation management standards in the SRLA (VEG S1, S2, S5, and S6), incidental damage to dense horizontal cover, and connectivity.

AFFECTED ENVIRONMENT

Introduction

The purpose of this document is to present the analysis and determination of effects of the alternatives on federally listed species (endangered, threatened, and proposed)(FSM 2670.31-2670.32).
This biological evaluation report (BE) conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). Under the ESA, the effects analysis report is called a biological assessment (BA) and must be prepared for federal actions that are “major construction activities” to evaluate the potential effects of the proposal on listed or proposed species and critical habitats. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that TEPS species receive full consideration in the decision-making process. A separate biological evaluation was prepared to address Forest Service sensitive species and Management Indicator Species (MIS).

This document also includes information specific to analyzing projects under the Southern Rockies Lynx Management Direction (SRLA). The aim is to ensure that the appropriate information is used in the effects analysis and provided to the U.S. Fish and Wildlife Service that leads to streamlined consultations on SRLA projects.

Description of the Proposal

Medicine Bow National Forest proposes to conduct vegetation management activities on NFS lands, including inventoried roadless areas, within the Sierra Madre and Snowy Range Mountain Ranges of the Medicine Bow National Forest. The Notice of Intent for the LaVA EIS described that vegetation

management activities, including prescribed fire, mechanical, and hand treatment methods, could be applied to 150,000 – 350,000 acres within the designated Treatment Opportunity Areas (615,230 acres) to protect, restore and enhance forest ecosystem components; reduce wildfire risk to communities and municipal water supplies; supply forest products to local industries; and improve, protect, and restore wildlife habitat.

This Scoping Document provides additional specificity in the amount, timing and types of proposed activities:

- Stand initiating or even-aged treatment methods would not exceed 95,000 acres.
- Uneven-aged or intermediate treatments would not exceed 165,000 acres.
- Other vegetation treatments including prescribed fire, mastication, and hand thinning would not exceed 100,000 acres.
- Cutting trees or shrubs using a variety of treatment methods including, but not limited to, clearcutting/coppice; group and individual tree selection; salvage; mastication; sanitation; and thinning.
- Cutting trees that have encroached on grass and shrublands to maintain desired species dominance and improve wildlife habitat.
- Prescribed burning areas using jackpot, pile burning, and broadcast burning. Maintenance burns on previously treated areas would occur to maintain desired fuels or habitat conditions.
- Prescribed burning or tree/shrub cutting on portions of inventoried roadless areas (IRAs). The Treatment Opportunity Areas (TOAs) in IRAs were proposed by Cooperating Agencies and the Forest Service to protect communities at risk; threatened and sensitive wildlife habitat; critical infrastructure including fences and ditches; and municipal water supplies.
- No new permanent or temporary road construction would occur in IRAs.
- Tree clearing and/or removal along critical linear structure including fences, ditches, and utilities;
- Utilizing and/or reconstructing existing open and closed NFS roads to access treatment units. Reconstruction may include road blading, culvert installation or replacement, and gravelling. Closed NFS roads would be for administrative access only (i.e., they will be managed as closed to the public) and would be returned to a closed status with the method of closure being determined at implementation.
- Constructing not more than 600 miles of temporary road, as necessary, to access treatment areas. The final assessment of road needs has not been determined and could be less.
- While open, temporary roads would be for administrative use only (i.e., they would be managed as closed to the public). Temporary roads would be decommissioned following treatment activities to preclude future motorized use and to restore ecological function; decommissioning returns a road to a natural state.
- Methods for temporary or system road decommissioning may include, but are not limited to, re-contouring the road, ripping/scarifying the roadbed, removing culverts, installing drainage features, creating physical barriers to preclude motorized travel, scattering wood/rock debris onto the road, applying seed and mulch to the area, and posting signs.

- Developing checklists, standards, protocols, and monitoring requirements in the environmental impact statement to guide project implementation, including:
    - Complete all required surveys for each individual treatment area; complete required layout and marking of each treatment area; determine appropriate design features to be applied; and document compliance with requirements of the environmental impact statement using a set of pre-established field checklists.
    - Perform monitoring during and following implementation of individual treatment activities to ensure treatments are implemented as planned and that project objectives are met.
    - Establish an annual monitoring review with interested stakeholders, partners, and collaborative groups to ensure treatments are implemented as planned and that project objectives are being attained.
- Using a combination of commercial timber sales, service contracts, stewardship contracts, cooperative authorities, partner capacity, and Forest Service crews to implement the project.
- Conducting regeneration surveys, noxious weed control, native grass seeding, and road maintenance associated with implementing vegetation treatments.
- Treatment projects would be authorized within a 10-year period beginning in 2018 and implementation of the final projects would be completed within approximately 15 years of the project decision.

THREATENED, ENDANGERED, AND PROPOSED SPECIES AND DESIGNATED CRITICAL HABITAT CONSIDERED AND ANALYZED

On February 16 2018, a list of threatened, endangered, and proposed species that may be present in the AA within the Medicine Bow-Routt National Forest was received from the U.S. Fish and Wildlife Service IPAC (Consultation Code 06E13000-2018-SLI-0116, Event Code 06E13000-2018-E-00470).

The Table below includes threatened, endangered, and proposed species, and/or designated critical habitat identified for the project from IPAC. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included Forest Service files and wildlife observation database (NRIS Wildlife) and published research. Amphibians, fish, and plant species are analyzed in other biological assessments but results are presented here.

Candidate species have sufficient information on their biological status and threats to warrant a proposal to list as Endangered or Threatened, but development of a listing regulation is precluded by other higher priority listing activities. Species that are candidates for listing under the ESA are automatically placed on the Region 2 Regional Forester's sensitive species list. The analysis and

determination of effects for candidate species are included as part of the biological evaluation (BE) for sensitive species. The BE is available upon request.

No further analysis is needed for species that are not known or suspected to occur in the project area, and for which no suitable habitat is present. The following table documents the rationale for excluding a species. If suitable but unoccupied habitat is present, then additional survey is needed, or presence can be assumed and potential effects evaluated.

Table 1. Threatened, Endangered, or Proposed Species

Species	Status	Distribution	Habitat and Presence	Determination
Canada lynx (*Lynx canadensis)*	Threatened	Resident in forested types. Most likely to occur within established Lynx Analysis Units (LAUs).	Analysis Area includes all LAUs in the Snowy Range and Sierra Madre Range and the North Gate and Snowy Range linkage corridors.	May Affect, Likely to Adversely Affect (following exemptions and exceptions in the Southern Rockies Lynx Amendment)
Preble's Meadow Jumping Mouse (*Zapus hudsonicus preblei)*	Threatened	Eagle and Shellrock Creeks and Laramie River < 1 mile from Forest boundary southwest of Jelm	Dense vegetation within 120 m of water and riparian areas below 8000 ft. (in USDI FWS 2016)	No Effect. No actions proposed in suitable habitat. Project Design Criteria (p. 44 below) specifically prohibits treatment in Preble's meadow jumping mouse habitat.
Wyoming Toad (*Bufo hemiophrys baxteri*)	Endangered	Laramie Plains Lakes and associatd waterways	Suitable habitat not present near proposed actions.	No Effect.
Piping plover (*Charadrius melodus)*	Threatened	Lower Platte River drainage	Suitable habitat not present near proposed actions.	No Effect. No water depletion.
Least tern (*Sterna antillarum*)	Endangered	Lower Platte River drainage	Suitable habitat not present near proposed actions.	No Effect. No water depletion.
Whooping crane (*Grus americana*)	Endangered	Lower Platte River drainage	Suitable habitat not present near proposed actions.	No Effect. No water depletion.
Pallid sturgeon (*Scaphirhynchus Albus)*	Endangered	Lower Platte River Drainage.	Suitable habitat not present near proposed actions.	No Effect. No water depletion.

Western prairie fringed orchid *(Platanthera praeclara)*	Threatened	Lower Platte River drainage	Suitable habitat not present near proposed actions.	No Effect. No water depletion.
Ute Ladies'-tresses (*Spiranthes diluvialis*)	Threatened	Suitable habitat below 7000 ft	Suitable habitat not present near proposed actions.	No Effect.
Bonytail chub (*Gila elegans*)	Endangered	Yampa, Green, and Colorado River systems	Project activities will have no impact or depletion to Colorado River water supply. Species not present in project area.	No Effect. No water depletion.
Colorado pikeminnow *(Ptychocheilus lucius)*	Endangered	Yampa, Green, and Colorado River systems	Project activities will have no impact or depletion to Colorado River water supply. Species not present in project area.	No Effect. No water depletion.
Humpback chub *(Gila cypha)*	Endangered	Yampa, Green, and Colorado River systems	Project activities will have no impact or depletion to Colorado River water supply. Species not present in project area.	No Effect. No water depletion.
Pallid sturgeon *(Scaphirhynchus albus)*	Endangered	Yampa, Green, and Colorado River systems	Project activities will have no impact or depletion to Colorado River water supply. Species not present in project area.	No Effect. No water depletion.
Razorback sucker *(Xyrauchen texanus)*	Endangered	Yampa, Green, and Colorado River systems	Project activities will have no impact or depletion to Colorado River water supply. Species not present in project area.	No Effect. No water depletion.
Yellow-Billed Cuckoo *(Coccyzus americanus)*	Threatened	Lower elevation riparian areas west of Continental Divide	Suitable habitat not present near proposed actions.	No Effect

CONSULTATION TO DATE

The LAVA project was discussed with the southern Wyoming Level 1 team on September 26, 2017 in Rock Springs, WY. Much of the discussion centered on Canada lynx and the substantial use of exemptions and exceptions to the 4 vegetation management standards (S1, S2, S5, S6) in the Southern Rockies Lynx Amendment (SRLA) (USDA 2008). Extensive use of exemptions and exceptions is considered an adverse effect (USDI 2008). The Level 1 team provided tentative agreement to a determination of may affect, likely to adversely affect Canada lynx following the BO (USDI 2008) for the SRLA relative to the use of exemptions and exceptions. Updates to the LAVA project and NEPA progress

were presented to the Level 1 team on May 30, 2018 in Rock Springs WY. LAVA project represents a tiered consultation from the consultation conducted under the SRLA (USDA 2008).

LAVA project was discussed on several other occasions from November 2017 through March 2018 with U.S. Fish and Wildlife Service biologist Lisa Solberg-Schwab. Among discussion topics was a project Design Criteria to provide habitat for migratory birds in treatment units over time. The final Design Criteria is:

Outside of WUI, vegetation management actions will be designed to retain or promote unique features for overstory and understory diversity if feasible. These unique features can include items such as snags, uncommon trees, or woody debris.

SPECIES INFORMATION

Canada Lynx *Lynx canadensis*

All lynx habitat for the National Forests in the Southern Rockies is identified as occupied in the SRLA decision. The best available science was used for this analysis including the FEIS for the SRLA (USDA 2008), the Biological Opinion for the SRLA (USDI 2008), the SRLA Implementation Guide (USDA 2009), the Lynx Science Report (Ruggiero et al. 1999), the revised Lynx Conservation Assessment and Strategy (Interagency Biology Team 2013), and literature referenced at the end of this BA. Descriptions below summarize information from these sources.

Life History

Description: Canada lynx are described as medium-sized cats, 30-35 inches and weighing 18-23 pounds (Quinn and Parker 1987). Their large feet are adapted to walking on snow; they have long legs, tufts of hair on the ears, and black-tipped tails. Their historical range extends from Alaska across most of Canada (except for coastal forests) and southern extensions into parts of the western United States, the Great Lakes states, and New England (McCord and Cardoza 1982). Breeding occurs through March and April in the north (Quinn and Parker 1987). Kittens are born in May to June in south-central Yukon (Slough and Mowat 1996). The male lynx does not help with rearing young (Eisenberg 1986).

Movement and Dispersal: Studies in Montana, Wyoming, and southern British Columbia have documented exploratory movements by resident lynx during the summer months (Apps 2000, Squires and Laurion 2000). Aubry *et al.* (2000) described this type of movement as long-distance movements beyond identified home range boundaries, then returning to the original home range. Distances of exploratory movements in Montana ranged from about 9 miles to 25 miles, and duration away from the home range was one week to several months (Squires and Laurion 2000). This type of movement was not detected during the study in northcentral Washington (Koehler 1990), nor has it been recorded from the taiga (Mowat *et al.* 2000). Aubry *et al.* (2000) speculated that these movements might be more likely to occur in areas with high spatial heterogeneity, especially montane systems.

Many of the lynx habitats in the Rocky Mountains occur as islands of coniferous forest surrounded by shrub-steppe habitats. Lynx have been documented in shrub-steppe habitats adjacent to western boreal forests (within approximately 25 miles) during a peak in the jackrabbit population (Lewis and Wenger 1998). It is not known whether these shrub-steppe habitats are important to lynx persistence at the southern edge of their range, or whether they are only used opportunistically (Ruggiero *et al.* 2000).

Diet: The primary prey of lynx is snowshoe hares; this species comprises 35-97 percent of the diet throughout the range of the lynx (Koehler and Aubry 1994). Other prey species include red squirrel, grouse, flying squirrel, ground squirrel, porcupine, beaver, mice, voles, shrews, fish, and ungulates as carrion or occasionally as prey (Saunders 1963, van Zyll de Jong 1966, Nellis *et al.* 1972, Brand *et al.* 1976, Brand and Keith 1979, Koehler 1990, Staples 1995, O'Donoghue *et al.* 1998).

During the cycle when hares become scarce, the proportion and importance of other prey species, especially red squirrel, increases in the diet (Brand *et al.* 1976, O'Donoghue *et al.* 1998, Apps 2000, Mowat *et al.* 2000). However, Koehler (1990) suggested that a diet of red squirrels alone might not be adequate to ensure lynx reproduction and survival of kittens.

Most research has focused on the winter diet, and diets in the summer may include a greater diversity of prey species (Quinn and Parker 1987, Koehler and Aubry 1994). Mowat *et al.* (2000) reported that summer diets have less snowshoe hare and more alternative prey, possibly because of a greater availability of other species.

Foraging habitat consists of early successional forests where snowshoe hares are plentiful, especially at northern latitudes. These are the habitats that lynx favor for hunting. Such forests may result from fires, timber harvesting, or windthrow and disease (numerous citations in Koehler and Aubry 1994). Late successional conifer stands also provide important foraging habitat for lynx. An important characteristic of both is dense branching of conifer species where tree crowns touch the ground, and the persistence of the canopy above winter snow levels. Regenerating lodgepole pine (or Douglas fir) provides short to moderate term cover and forage for lynx, but primarily provides high density food for snowshoe hare (Koehler 1990). Mature, dense Engelmann spruce-fir forest provides long-term cover and forage opportunities for both lynx and snowshoe hare.

Conifer stands provide greater concealment from predators, lighter snowpacks, and warmer temperatures during winter than hardwood stands. Dense stands of aspen in the Rocky Mountains represented marginal foraging habitat for lynx because such stands do not provide adequate cover for hares, suggesting that conifer cover is critical for hares during winter (Miller 2005). In Colorado and Utah, dense stands of subalpine fir and Engelmann spruce and Douglas-fir were used most frequently by hares (Dolbeer and Clark 1975).

Stem height is also an important component of winter foraging habitat. In the Rocky Mountains, where snow depths may exceed 1.5 m, Dolbeer and Clark (1975) found that sparsely stocked stands provided little food or cover for hares, and Wolfe et al. (1982) reported that 85% of habitats used by hares had a horizontal cover density of 40% at a height of 1.0 - 2.5 m above the ground.

Clarification for the northern Rockies lynx amendment (Bertram and Claar 2008) indicated that "mature multistoried forests provide important winter snowshoe hare habitat and are more important than younger stands. Corresponding research results from Squires and DeCesare (2008) indicates that snowshoe hares were most abundant in these stands with >35% horizontal cover in winter or >48% horizontal cover in summer. In the southern Rocky Mountains (Colorado and Utah), more recent information suggests that mid-seral lodgepole pine (5-8" DBH) is preferred by hares over young seral lodgepole pine (1-5" DBH), especially in the winter, due to the abundance of dense, interlocking stems that are available above the snow (Murray 2001, Miller 2005, Ivan 2007).

Population Distribution: Density of lynx in an area is highly dependent on prey abundance. Home ranges of lynx are generally larger in southern habitats, where snowshoe hare densities are low. In western Wyoming, home ranges are approximately 42 square miles for males and 35 square miles for females (Squires and Laurion 2000). Lynx appear to remain close to their established home ranges in the winter and exhibit more extensive exploratory movements in the summer (Squires and Laurion 2000, Shenk 2008).

In an effort to establish a viable population of lynx in Colorado, 218 lynx were reintroduced into southwestern Colorado between 1999 and 2006. By 2009, 49 lynx were still being monitored (CPW, accessed 02/2010). CPW tracked reintroduced lynx to identify areas that animals travel through or are using on a more regular basis. Generally, tracking results (Shenk 2008) indicated a decrease in use with increased distance from the southwest Colorado release sites. Since 1999, 9 lynx were confirmed on the Medicine Bow NF from locations obtained from both aerial searches for VHF radio signals and from transmissions to satellites from the satellite transmitters (Shenk 2007).

CPW determined the population was stable and self-sustaining in 2010 and monitoring with telemetry was not continued. CPW now monitors the population with a less invasive track and trail camera sampling protocol across the state.

The Forest Service maintains a spatial database of documented special status species observations (NRIS Wildlife). The database indicates that five observations of lynx have been documented from 1856 through 2006. Two occurred prior to 1912, the remaining three after 1996. The database contains no observations of lynx after 2006.

Surveys were conducted according to National Lynx Detection Protocol on the Laramie and Brush Creek-Hayden Districts in 2000, 2001, and 2002. "Hair snare" transects were conducted for three consecutive years (2000-2002) on the Brush Creek/Hayden and Laramie Ranger Districts, using the National Survey Protocol. Each year, 25 transects, each containing 5 hair-collecting pads, were left at baited stations for 4 weeks. No lynx hairs were collected. Results revealed that samples from 2 mountain lions and 1 black bear were collected in 2000 and 1 coyote, 1 bobcat, and 1 ungulate in 2001. Samples collected in 2002 included 1 bobcat, 2 coyotes, and 1 domestic cow.

Landscape Connectivity (from USDI 2008):

"Lynx require a regional or sub-regional approach to connectivity management because of their free ranging habits. Lynx need to be able to move between different geographic areas and mountain ranges.

In some cases, they move long distances through unfavorable habitat. If linkages or corridors are blocked because of human alteration, lynx populations can become isolated and more vulnerable to extirpation in the long term.

The Southern Rocky Mountains have a naturally fragmented spatial pattern of lynx primary habitat. Ruediger et al. (2000, pg. 4-23) states:

"In the Southern Rockies, urban expansion and development has further fragmented an already patchy distribution of lynx habitat: Valley floor development continually erodes the amount of non-forest habitat; The expansion of homes and some municipal facilities up mountain slopes, into forests of aspen, lodgepole pine, and to a lesser degree spruce-fir, adds to the fragmentation of a naturally fragmented landscape; The cumulative effect of private land development and expansion of recreational facilities in and adjacent to lynx habitat may reduce the ability of lynx to move throughout their home range, or interact with other individuals in the larger subpopulation.

The capability to maintain a meta-population in this area depends on successful dispersal between habitat fragments, and potentially between geographic areas. Increased fragmentation and isolation has occurred due to cumulative impacts from highways and residential and recreational development often tied to ski areas developed on National Forest System lands (Hickenbottom et al. 1999). While the ecosystem remains largely interconnected at this time, ongoing development and other activities continue to pressure those linkages. Since the SRMGA may not be connected to the Northern Rockies due to large expanses of desert in between, maintenance of regional scale habitat connectivity is perhaps more important in this geographic area than any other (Hickenbottom et al. 1999). The I-70 highway corridor, along with the development of resorts and the associated subdivisions and entire communities, has comprised the permeability of portions of the area in the center of the SRMGA."

Habitat: Mature to late-successional spruce-fir forests have been described as suitable foraging habitat for Canada lynx in the southern portion of their range. These forests can support snowshoe hares, the primary prey species for lynx, as well as red squirrels, an important alternative prey species. Conifer-aspen forests, particularly those with dense regeneration or an extensive shrub and woody debris understory component, may also be important for prey species. Mature forest stands are used for denning, cover for kittens and travel corridors. Denning habitat has been described as areas having dense downed trees and root wads, or dense live vegetation (Koehler 1990, Mowat *et al.* 2000). For denning habitat to be functional, it must be in or adjacent to large areas of quality foraging habitat (Ruediger *et al.* 2000).

Lynx habitat in the Southern Rocky Mountains is naturally fragmented, a function of elevation, aspect, and local moisture regimes. Primary lynx habitat is likely found within the subalpine and upper montane forest zones, typically between 8,000 and 12,000 feet. High alpine tundra environments and lower, open valleys define the upper and lower elevation boundaries of this habitat. Drier, south- and west-facing slopes may also break up the continuity of the cooler, mesic high elevation forest habitat utilized by lynx (Ruediger *et al.* 2000). Site-scale habitat data collected for lynx in Colorado indicate that lynx commonly use forest stands that have live foliage of Englemann spruce present in the understory from the snow surface to at least 3.8 feet above the snow; thus lynx are using areas that provide winter browse for

snowshoe hare (Shenk 2001). Additional forest types, high elevation sagebrush and mountain shrub communities found adjacent or intermixed with forest habitats, and riparian and wetland shrub communities are also potentially important habitat in many parts of the Southern Rockies, as they may support alternative prey species.

Denning habitat consists of mature forest habitats that contain large woody debris, such as fallen trees or upturned stumps, to provide security and thermal cover for kittens (several citations in Koehler and Aubry 1994). In north central Washington, lynx denned in spruce/fir/lodgepole stands having N-NE aspects and a high density of downed trees.

The availability of alternate den sites may be an important determinant of habitat quality. In low quality habitat, the inability of females to move kittens to alternate dens when danger threatens may increase mortality rates for kittens (Koehler and Aubry 1994). Travel corridors between den sites are important to permit females to move kittens to areas where prey is more abundant or to avoid disturbance (Koehler and Brittell 1990). Den sites are also selected based on their proximity to foraging habitats. Den sites consisting of mature forest habitat are also important for lynx as refugia from inclement winter weather or drought.

Threats from human activity

Loss of habitat suitable for the lynx or its primary prey, the snowshoe hare, is a primary threat to lynx (Federal Register Volume 65, Number 58, p. 16074 and 16082). Development of ski areas, resorts, and residences reduces habitat locally.

The BA for the SRLA addressed seven risk factors. Risk factors of trapping, predator control, and incidental/illegal harvest would not be changed from the environmental baseline by projects that follow the management direction outlined in the SRLA. The risk factor of competition and predation is minimized by HU G10 that discourages the development of new over-the-snow routes outside the baseline areas of snow compaction. The SRLA BA indicates that the objectives, standards and guidelines in the amendment would ensure connectivity, addressing the risk factor of habitat connectivity. Habitat connectivity is addressed in this BA also. The SRLA "Other Risk Factors" of mineral exploration and developed ski recreation are not impacted by the LAVA project. Other Risk Factor, roads, is addressed in this project. Proposed actions will be addressed relative to this management direction in the SRLA. The risk factor of vegetation management relates directly to proposed actions. The proposed actions will be addressed relative to these management directions in the SRLA.

ENVIRONMENTAL BASELINE

Southern Rockies Lynx Amendment

The Southern Rockies Lynx Amendment amends Forest Plans in Colorado and on the Medicine Bow National Forest in Wyoming (USDA 2008). The SRLA decision supersedes the 2006 Lynx Conservation

Agreement (USDA 2005) for National Forests covered by the Amendment, which includes the Medicine Bow-Routt National Forests. The SRLA provides standards and guidelines for various management activities (vegetation management, recreation, forest roads and trails, highways, as well as oil and gas leasing) to establish management direction that conserves and promotes the recovery of lynx, and reduce or eliminate potential adverse effects from land management activities. One *goal* (conserve the Canada lynx) and thirteen *objectives* were developed. *Standards* are management requirements to meet the *objectives* and cannot be deviated from. Under SRLA decision, *standards* are applied only to vegetation management activities that have the potential to directly affect snowshoe hare prey and thus impact lynx at the population level. *Guidelines* are recommended management and any deviations from guidelines would be considered after analysis of site-specific conditions and in compliance with ESA Section 7 consultation requirements.

Ryan Park Farm Bill Categorical Exclusion (CE)

Analysis of LAU conditions for the LAVA project incorporated changes to lynx habitat as a result of the recently completed Ryan Park CE. Changes to lynx habitat from the consultation for Ryan Park CE are reflected in the existing conditions for LAUs in Table 2 below.

Mountain Pine Beetle

Over the last 15 years there was a dramatic increase in mountain pine beetle (MPB) activity and conifer tree mortality in northern Colorado and southern Wyoming. In an attempt to define and track the effects of the infestation, entomologists from the Lakewood Service Center in Lakewood, Colorado analyzed aerial and ground survey data sets of national forests containing lodgepole pine at risk for MPB infestations. The analysis included all or portions of the White River, Arapaho, and Routt NFs in northern Colorado and portions of the Medicine Bow NF in southern Wyoming. Results of the analysis, as documented in Report LSC-07-06, confirmed the following: 1) MPBs were at epidemic levels in northern Colorado and southern Wyoming; and 2) they did not likely depart from their current course because there was no period of prolonged and severe low temperatures (<-30º F) occurring during late fall-winter-early spring months.

The mountain pine beetle infestations and their impact on lodgepole pine forests were likely influenced by a number of factors, including: 1) an abundance of older, dense, large diameter lodgepole pine stands; 2) prolonged drought; 3) earlier melting of the smaller, drought-influenced snowpacks, resulting in extended and more severe drought conditions; 4) higher temperatures, allowing for an expansion of the one-year mountain pine beetle lifecycle into areas of lodgepole pine forests at higher elevations (>9,500 feet elevation); and 5) greater survival of mountain pine beetle broods in the high elevation lodgepole pine forests.

Aerial survey data showed that over 223,000 acres on the Routt NF and 75,000 acres on the Medicine Bow NF were impacted by MPBs. By 2007, acres impacted by the beetles had escalated to 350,000 acres on the Routt NF and 178,000 acres on the Medicine Bow NF. Over the course of the mountain pine beetle epidemics in Colorado and southern Wyoming since 1996, 3.6 million acres have been affected.

Only 2600 acres were affected across the Medicine Bow NF by 2015 due to the depletion of suitable stands of host (live) trees.

Lynx Habitat

A model for mapping lynx habitat was developed using habitat definitions and descriptions contained in the Lynx Conservation Assessment and Strategy (LCAS, Ruediger et al. 2000) and the Forest's RIS vegetation database. This effort was completed in 2001. Since that time, annual field verification of some modeled lynx habitat, a MS Thesis on snowshoe hare habitat use on the Routt National Forest (Miller 2005), updated and more detailed vegetation data in the Forest's R2Veg database, and changes from annual beetle mortality flights led to changes to lynx habitat characterization across LAUs. A dramatic change was the conversion of most suitable lynx habitat to an unsuitable condition as a result of mountain pine beetle caused mortality in lodgepole pine stands. This outbreak resulted in a large conversion of lynx habitat to currently unsuitable condition (stand initiation structural stage) in 2008.

Another large revision of lynx habitat was conducted in 2010 to account for more recent information about habitat characteristics, prey habitat, and pine beetle caused mortality (see Dressen and Tolbert 2010). This effort changed LAUs, LAU boundaries, habitat characterization within LAUs, and linkage corridor boundaries. US Fish and Wildlife offices in Wyoming and Colorado accepted these changes in December 2010.

A final adjustment to lynx habitat was completed by the end of 2017. Recent information suggests tree mortality as a result of the insect outbreak was not as severe as predicted; mortality did not approach 100% for all medium or larger sized lodgepole trees. The Medicine Bow-Routt National Forests incorporated data from the Forest Service Remote Sensing Applications Center (RSAC). Remote sensing data suggested tree mortality was less than previously predicted for most forested stands containing lodgepole pine. Field verification occurred with stand exams and related forest evaluation methods over three summers. Results were incorporated into the Forest's FSVeg spatial database. The result for Canada lynx is that the predicted impacts of the insect outbreak to habitat was reduced. Most habitat in most LAUs is now considered suitable habitat because tree survival is higher than predicted earlier. The change in tree canopy cover was less than 60% in many cases. A tree canopy cover change of $\geq$60% is considered sufficient for stand initiation to occur (currently unsuitable habitat). Analysis of beetle-killed stands by Forest silviculturalists and the results from RSAC field verification led to the 60% change threshold for stand initiation. Dressen and D"Arcy (2017) provide a more detailed discussion of this process. This high level of stand mortality equating to stand initiation (currently unsuitable habitat) is consistent with definitions in the SRLA (2008) implementation guide. This guide defines stand initiation structural stage as the "stage generally develops after a stand replacing disturbance by fire, insects, or regeneration timber harvest…" (p. 1-14). The guide also identifies unsuitable condition as situations such as "Stand replacing fire, insect epidemics, or certain vegetation management projects…"(p. 1-12). The described adjustment to lynx habitat was discussed with the Forest Service Rocky Mountain Regional Office in May 2017 and approved by US Fish and Wildlife Service in January 2018 (Appendix B).

There are several LAUs along the Wyoming-Colorado border in the Sierra Madre Range where field evaluation confirmed that tree mortality is high and many acres of habitat are in a stand initiation stage.

These LAUs were impacted by the insect/disease outbreak several years earlier and at through the peak of the outbreak compared to the other LAUs on the Medicine Bow NF.

There are six LAUs within the Snowy Range and the Snowy Range linkage corridor that extends south into Colorado. There are two LAUs, Upper Sierra Madre and Battle Creek, that occur completely within the Sierra Madre Range on the Medicine Bow NF. The majority of two LAUs, Hog Park and Blackhall Mountain, occur in the Sierra Madre Range on the Medicine Bow NF. Only a very small portion of three LAUs, Little Snake River, Diamond Park, and Red Elephant Mountain, occur in the Sierra Madre Range on the Medicine Bow NF. The vast majority of these last 3 LAUs occurs on the Routt NF in Colorado. The North Gate Linkage corridor is split between Wyoming and Colorado. Vegetation management with mechanical equipment, prescribed fire, or hand tools can occur.

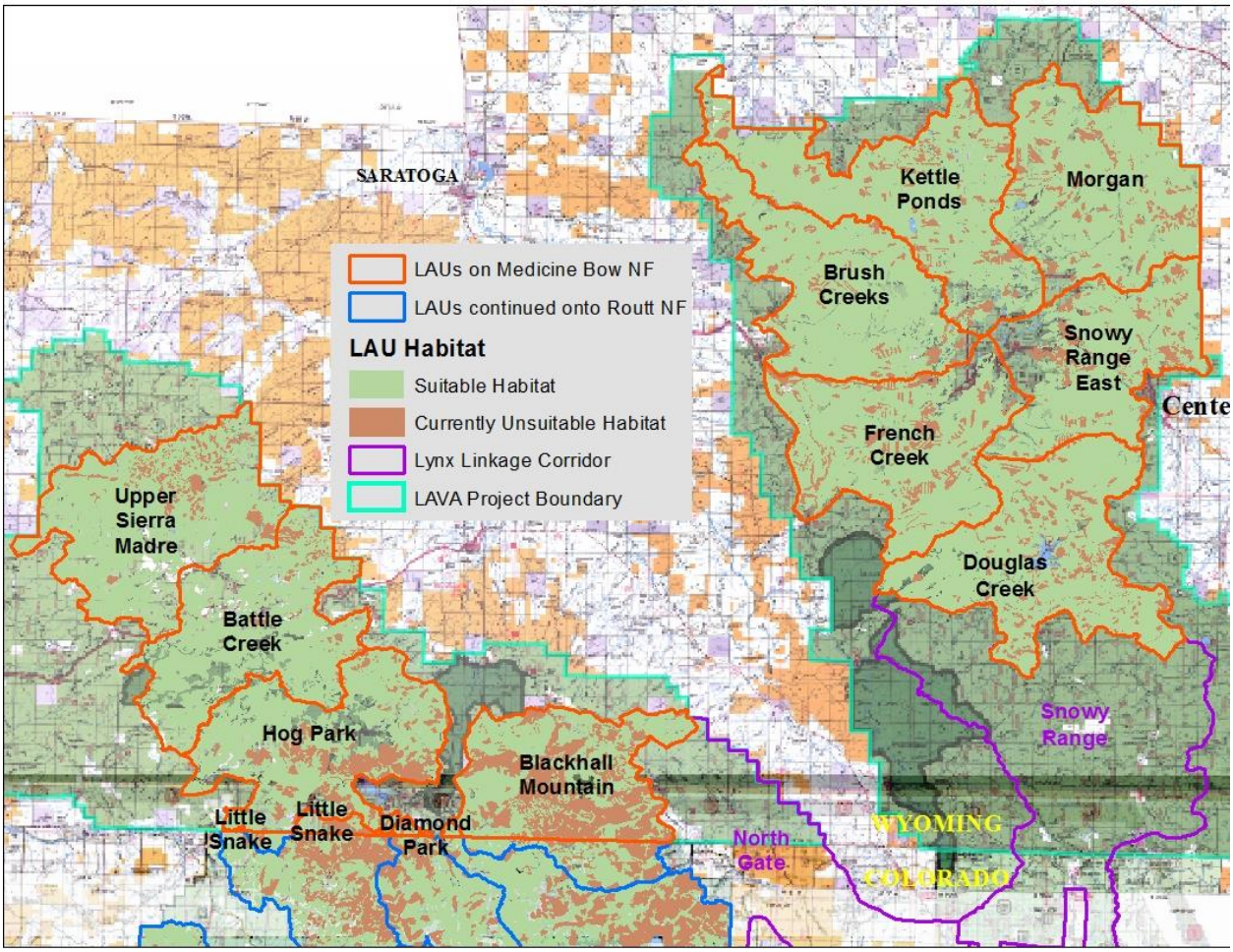

Figure 1. LAUs and Linkage Corridors in LAVA project.

Table 2. Existing Habitat Conditions in each LAU.

LAU Name	Total Habitat (acres)	Suitable Habitat (acres)	Unsuitable Habitat (acres)	Unsuitable Habitat (%)	Unsuitable Habitat by Mgt in last 10 yrs. (acres)	Unsuitable Habitat by Mgt in last 10 yrs. (%)
SNOWY RANGE						
Brush Creeks	42877	39629	3248	7.6	365	0.9
Douglas Creek	49902	44106	5796	11.6	1528	3.1
French Creek	43524	36438	7086	16.3	2127	4.9
Kettle Ponds	46891	42892	3999	8.5	94	0.2
Morgan	43081	38869	4212	9.8	16	0.04
Snowy Range East	32697	29066	3631	11.1	322	1.0
SIERRA MADRE RANGE						
Battle Creek	35035	32879	2156	6.2	694	2.0
Blackhall Mtn	43532	26634	16898	38.8	1828	4.2
Diamond Park	35490	23200	12290	34.6	1022	2.9
Hog Park	37396	30212	7184	19.2	991	2.7
Little Snake	46462	32513	13949	30.0	971	2.1
Red Elephant Mtn.	38508	24445	14063	36.5	112	0.3
Upper Sierra Madre	40557	37267	3290	8.1	108	0.3

ENVIRONMENTAL CONSEQUENCES

Vegetation management by mechanical or prescribed fire methods or by prescribed fire or hand tools only can occur in most LAUs and the Snowy Range linkage corridor. Mechanical or prescribed fire methods can be used in the three LAUs that occur predominantly in Colorado and in the North Gate linkage corridor. LAUs and linkage corridors contain no treatment areas such as Wilderness areas or wetlands.

LAVA project treatments are condition based. The exact location and treatment type (Appendix A) to occur will depend on conditions such as percent of dead trees in a stand, amount of understory vegetation, whether the treatment occurs in WUI, or in some cases, whether the treatment occurs in lynx habitat.

SRLA Consistency

In the following section, the LAVA project is evaluated for consistency with the SRLA Standards and Guidelines for Human Uses (HU) Connectivity, and Vegetation Management (USDA Forest Service 2008). Only those standards and guidelines affected by the project are listed and evaluated below. Proposed actions are consistent with the terms and conditions of the SRLA section 7 consultation when WUI exemptions and exceptions to the SRLA standards are used. The SRLA includes a Habitat Connectivity Objective to maintain or restore habitat connectivity among LAUs and linkage areas (p. 5-1). Connectivity generally refers to large vegetation management projects, highway management, infrastructure development, and retaining habitat in public ownership (USDI 2008, BO p. 8). No permanent roads will be constructed for this project. LAVA treatments include 600 miles of temporary roads. Temporary roads will be not be open for public use. Temp roads will be obliterated to become part of the surrounding landscape. Obliteration will occur within 3 years of the completion of each vegetation management project. Some proposed vegetation management was removed from consideration in the Battle Creek LAU in order to maintain this LAU below 30% unsuitable habitat. Several surrounding LAUs in the Sierra Madre Range exceed 30% unsuitable habitat due to the insect/disease outbreak. Retention of suitable habitat in the Battle Creek LAU as a “bridge” among LAUs with fewer suitable acres was one of the considerations for excluding some earlier proposed treatments. All LAUs in the Snowy Range will remain below 30% unsuitable. Connectivity will be maintained.

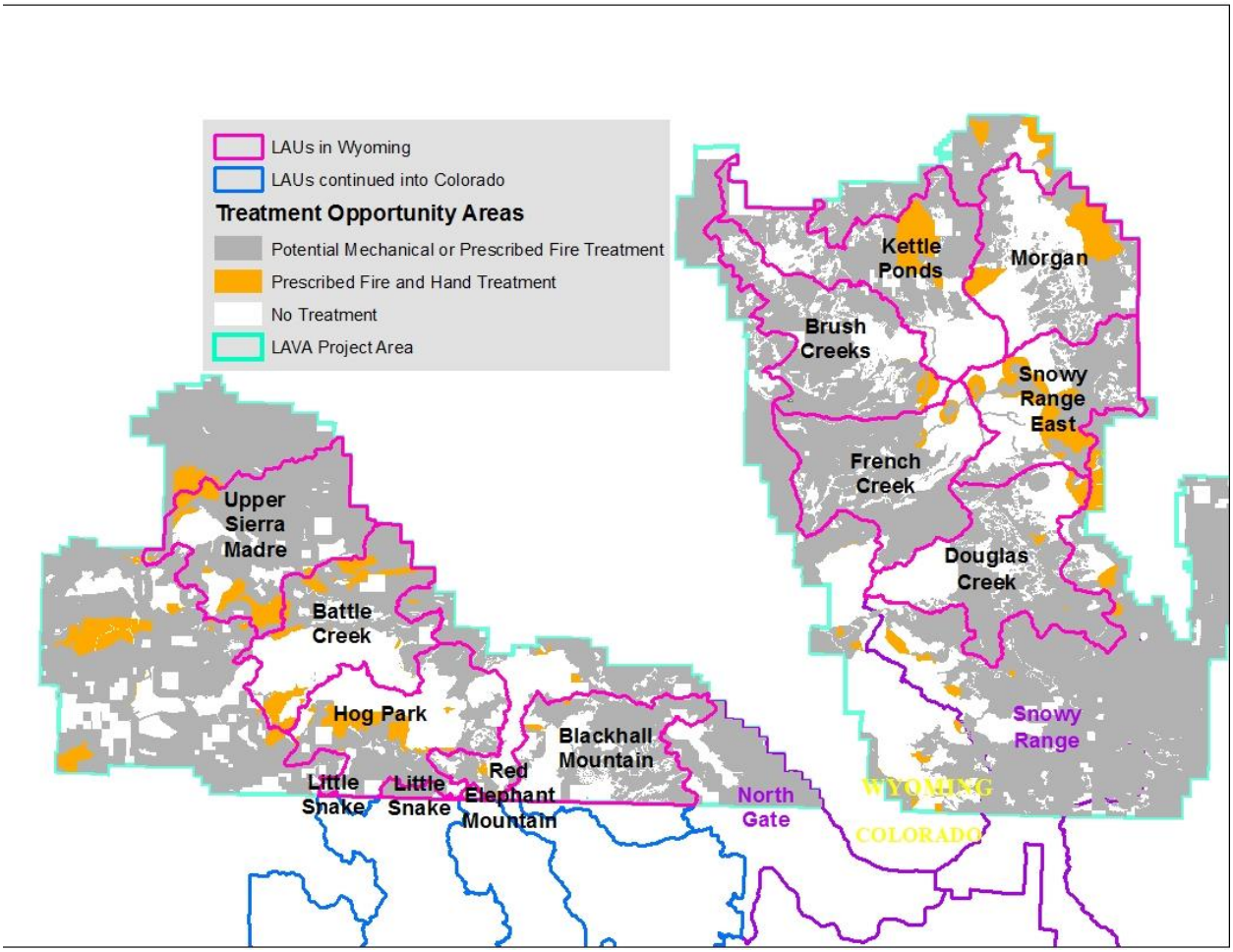

Figure 1. LAUs, Linkage Corridors and Treatment Opportunities in LAVA project.

Human Uses Guideline HU G6

Methods to avoid or reduce effects to lynx habitat connectivity should be used when upgrading unpaved roads to maintenance levels 4 or 5, where the result would be increased traffic speeds and volumes, or contribute to development or increases in human activity.

The proposed actions will not upgrade any roads to level 4 or 5. The project is consistent with this guideline.

Human Uses Guideline HU G7

New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.

No new permanent roads are proposed to be built. The project is consistent with this guideline.

Human Uses Guideline HU G8

Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

Cutting brush will be completed only to improve sight distance on roads adjacent to harvest units. Roadside clearing on open roads will continue as authorized under the Hazard Tree project in 2008. The project is consistent with this guideline.

Human Uses Guideline HU G9

If project level analysis determines that new roads adversely affect lynx, then public motorized use should be restricted. Upon project completion, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

No new permanent roads will be constructed in lynx habitat. Temp roads will be obliterated after harvest, ripped to decompact soil, loaded with slash, and seeded if necessary. The project is consistent with this guideline.

Connectivity Standard ALL S1

New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage areas.

There will be no new or expanded permanent developments in LAUs or linkage corridors. There will be no road upgrades. The majority of acres available for vegetation management in the LAUs under LAVA (>64%, 86,536 acres) occur in unsuitable habitat or nonhabitat. All LAUs in the Snowy Range will retain >70% of the habitat in a suitable condition (Table 3).

Four of seven LAUs in the Sierra Madre Range already exceed 30% unsuitable habitat primarily as a result of the insect outbreak (Table 3). Three of these four LAUs will receive less than 88 acres of stand initiation treatment in suitable habitat. The Fourth LAU, Blackhall Mountain, will experience a 2.9% increase in unsuitable habitat as a result of LAVA implementation. Hog Park and Upper Sierra Madre will experience moderate to high amounts of stand initiation treatment in suitable habitat but still retain $\geq$67% of lynx habitat in a suitable condition. Battle Creek LAU will remain below 30% unsuitable habitat to facilitate connectivity among LAUs with lower percentages of suitable habitat.

Proposed actions will not preclude movement of lynx to other LAUs or within the LAU. Most habitat in all LAUs will be retained in a suitable condition and the Battle Creek LAU will serve as a bridge among LAUs with more unsuitable habitat as described above.

Stand initiation treatments in linkage corridors are most likely to occur in stands with high tree mortality rates from the insect/disease outbreak as defined for the various treatment methods in Appendix A.

Many of these stands are already considered unsuitable for lynx and lynx prey (see Dressen and D'Arcy (2017)). Vegetation management in these areas will not change the ability of lynx to forage in the area or move through the area. Stands will provide year-round snowshoe hare habitat within 30 years. Linkage corridors will maintain habitat sufficient for lynx travel.

Vegetation Management

Proposed vegetation management for each LAU is summarized in Table 3 below and described in Appendix C. The strategy for vegetation management in LAUs was to treat as much suitable habitat as necessary in order to treat all infrastructure WUI in suitable habitat in a LAU without exceeding S1 (30% unsuitable) or S2 (15% unsuitable in 10 yrs.). Infrastructure WUI is used here to identify all National Forest System lands within a 0.5 mile buffer of private land, following a HFRA definition. Often, however, it was necessary to use WUI exemptions and exceptions to treat all infrastructure WUI in a LAU. This was often the case in the southern LAUs in the Sierra Madre Range which experienced the longest exposure and the peak of the insect/disease outbreak. These LAUs exceeded 30% unsuitable habitat as a result of the outbreak with little influence from past vegetation management. So, proposed WUI treatments in these LAUs as a result of LAVA stand initiation treatment of suitable habitat would quickly exceed S1 or S2.

Second, harvest was focused on treating WUI identified in Counties' Community Wildfire Protection Plans that was not already included in the 0.5 mile buffers for infrastructure. This effort was balanced with an effort to retain some LAUs below 15% unsuitable in 10 years and 30% unsuitable in total.

Treatments within LAUs will adhere to the limitations provided in the SRLA, specifically WUI exemptions and exceptions for Standards S1, S2, S5, and S6. LAVA project will treat as many as 32,463 acres considered nonhabitat that occurs in mechanical, prescribed fire, or hand tool treatment areas (TOAs). These are often areas of very low tree cover, rock outcrops, or shrublands not adjacent to other lynx habitat. Total treatment of nonhabitat is likely to be less than 32,463 acres since features such as rock outcrops would have no vegetation management. LAVA project will treat as many as 37,377 acres of habitat in TOAs that is currently unsuitable, predominantly as a result of the insect/disease outbreak. LAVA treatments will also convert 34,206 acres of suitable habitat in TOAs to an unsuitable condition while remaining below the S1, S2, S5, and S6 treatment thresholds (i.e. without using exemptions and exceptions). LAVA project will then utilize 13,214 acres of the 3% WUI exemption to S1, S2, S5 and S6 for converting suitable habitat to an unsuitable condition, for precommercial thinning, or for treatments in multi-story stands, all to treat infrastructure WUI.

There are state and private lands within these LAUs. It is assumed that all suitable habitat on private and state land within each LAU will be converted to unsuitable habitat by those landowners. This assumption was subtracted from the total acres available for treatment for S1 and S2 so that LAVA proposed vegetation management would not exceed the LAU conditions predicted (i.e. not result in more unsuitable habitat across LAUs than predicted as a result of LAVA implementation). So, LAU

conditions in Table 3 reflect an assumed conversion of suitable habitat to unsuitable condition on private and state lands.

Table 3. LAU Habitat with LAVA Treatment (acres).

LAU	Total Habitat	Existing Current Unsuitable (%)	Assumed State and Private Habitat Treatment	Infrastructure WUI[1] present in LAU	Suitable Habitat Treatment (no exemption /exception needed)	Suitable Habitat WUI Treatment (3% exemption for 15% in 10 yrs)	Suitable Habitat WUI Treatment (3% exemption for 30% unsuitable)	LAVA Result Unsuitable in 10 yrs. (%)	LAVA Result Unsuitable (%)
SNOWY RANGE									
Douglas Ck	49902	5796 (11.6)	892	5562	4580			14.0	11268 (22.6)
Snowy Range East	32697	3631 (11.1)	0	665	4350			14.3	7981 (24.4)
Morgan	43081	4212 (9.8)	701	2042	5300			14.0	10213 (23.7)
Kettle Ponds	46891	3999 (8.5)	2780	5950	4159	1791		18.8	12729 (27.1)
Brush Creeks	42877	3248 (7.6)	1428	5320	4640	1200		17.8	10516 (24.5)
French Creek	43524	7086 (16.3)	252	2148	3850			14.3	11188 (25.7)

Upper Sierra Madre	40557	3290 (8.1)	1924	7834	4052	3782		24.3	13048 (32.2)
Battle Creek	35035	2156 (6.2)	2936	8606	175	4800		24.6	10067 (28.7)
Blackhall Mountain[2]	43532	16898 (38.8)	725	532	0		532	7.1	18155 (41.7)
Hog Park[2]	37396	7184 (19.2)	1011	2131	3100		1000	16.3	12295 (32.9)
Little Snake[2]	46462	13949 (30.0)	2	26	0		26	2.2	13977 (30.1)
Diamond Park[2]	35490	12290 (34.6)	191	0	0		83	3.7	12564 (35.4)
Red Elephant Mtn.[2]	38508	14063 (36.5)	0	0	0			0.3	14063 (36.5)
TOTALS	535,952	97,802	12,842	40,816	34,206	11,573	1641		158,064

1 Infrastructure WUI includes a 0.5 mile buffer around private lands within LAUs

2 These LAUs also occur in Colorado. Habitat conditions reflect entire LAU

Standard VEG S1

Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

Exceptions and Exemptions

- ◊ There is no exception for VEG S1.
- ◊ *Exemptions for fuel treatment projects within wildland urban interface (WUI) that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forest). In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.*

There are 38,819 acres of 3% WUI exemptions available under SRLA (Appendix B). Since SRLA inception, 5648 of those acres have been utilized. LAVA project will use another 13,214 acres of this WUI exemption acreage (39.7%) for S1. The exemption will be used to treat WUI in Blackhall Mtn., Little Snake, and Diamond Park LAUs, which are already over 30% unsuitable. Use of this WUI treatment exemption will also cause the Hog Park LAU to exceed 30% unsuitable. Treatment acres will be tracked annually by vegetation management project (i.e. timber sale or prescribed burn) to monitor annual use of the exemption.

The WUI exemption was not used to treat all WUI in the Battle Creek LAU. Fuels treatment cannot result in more than 3 adjacent LAUs exceeding 30%. Treatment was reduced in Battle Creek LAU to prevent this LAU from becoming the 4th adjacent LAU to exceed S1. Treatment acres will be monitored in the field and tracked annually by vegetation management project (i.e. timber sale or prescribed burn) to monitor annual use of the exemption. LAVA project use of 13,214 acres of exemptions is consistent with the use of WUI exemptions to S1. As mentioned previously, this analysis already accounts for conversion of all suitable habitat to an unsuitable condition on private and state land to calculate the use of 13,214 acres of WUI exemption use.

Standard VEG S2

Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. This 15 percent includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within

stands killed by insect epidemics, wildfire, etc. does not apply to the 15 percent, unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition.

Exceptions and Exemptions

- ◊ *There is no exception for VEG S2.*
- ◊ *Exemptions for fuel treatment projects within wildland urban interface (WUI) that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forest).*

There are 38,819 acres of 3% WUI exemptions available under SRLA (Appendix B). Since SRLA inception, 5648 of those acres have been utilized. LAVA project will use another 13,214 acres of this WUI exemption, 11,573 acres for S2. The exemption will be used to treat WUI in Battle Creek and Upper Sierra Madre LAUs in the Sierra Madre Range because WUI treatments will convert more than 15% of the suitable habitat to an unsuitable condition in 10 years. The exemption will be used to treat WUI in Kettle Ponds and Brush Creeks LAUs in the Snowy Range for the same reason. Treatment acres will be monitored in the field and tracked annually by vegetation management project (i.e. timber sale or prescribed burn) to monitor annual use of the exemption. LAVA project use of 13,214 acres of exemptions is consistent with the use of WUI exemptions to S2. As mentioned previously, this analysis already accounts for conversion of all suitable habitat to an unsuitable condition on private and state land to calculate the use of 13,214 acres of WUI exemption use.

Standard VEG S5

Precommercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to the following limitations from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat.

Precommercial thinning may occur only:

1. *Within 200 feet of administrative sites, dwellings, outbuildings; or*
2. *For research studies or genetic tree tests evaluating genetically improved reforestation stock; or*
3. *For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or*
4. *Based on new information that is peer reviewed and accepted by regional/state levels of the Forest Service and FWS where a written determination states*
    a. *That a project is not likely to adversely affect lynx; or*
    b. *That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat.*

5. *In addition to the above exceptions, (and above and beyond the three percent limitation for fuels projects within the WUI), pre-commercial thinning (PCT) may occur provided that:*
   a. *The additional PCT does not exceed one percent of the lynx habitat in any LAU for the life of this amendment, and the amount and distribution of winter snowshoe hare habitat within the LAU must be provided through appropriate site specific analysis and consultation; and*
   b. *PCT in LAU's with more than 30% of the lynx habitat currently in the stand initiation structural stage is limited to areas that do not yet provide winter snowshoe hare habitat; and*
   c. *Projects are designed to maintain lynx habitat connectivity and provide snowshoe hare habitat over the long term; and*
   d. *Monitoring is used to determine snowshoe hare response.*

Exceptions and Exemptions

- ◊ Exceptions 2 and 3 may not occur in any LAU in which VEG S1 is exceeded (i.e., more than 30 percent of LAU in stand initiation structural stage).

- ◊ Exception 5b limits precommercial thinning in LAU's with more than 30% of lynx habitat currently in the stand initiation structural stage to areas that do not yet provide winter snowshoe hare habitat.

- ◊ Exemptions for fuel treatment projects within wildland urban interface (WUI) that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forest)

A description of the PCT strategy for each LAU is provided in Appendix C. Lava treatments include 3978 acres (Table 4 below) of precommercial thinning (PCT) following the 1% allowance in exception 5 to S5. This is 1% of the total habitat for each LAU that occurs in Wyoming as displayed in Table 2. For example, this PCT is 499 acres in Douglas Creek LAU. PCT can retain suitable habitat as suitable habitat if more than 25% tree cover is retained. PCT converts suitable habitat to an unsuitable condition if thinning is extensive enough to reduce tree cover to 25% or less. PCT can occur in stands where trees are still too short ($\leq$ 6 ft. tall) to be considered suitable habitat, so treatment would not convert these stands to an unsuitable condition.

The 1% PCT can occur in any stand age class in the Douglas Creek, Snowy Range East, Morgan and French Creek LAUs in the Snowy Range since these LAUs will remain below 15% unsuitable by management actions in 10 years and below 30% unsuitable habitat total. If the PCT converts a stand to unsuitable condition (i.e. $\leq$10% tree cover or remaining trees are below average winter snow depth), then these acres will also contribute to the S1 and S2 tracking of unsuitable acres. Stands with tree height $\leq$ 6 ft. are already unsuitable habitat since they do not yet protrude above the average snow level on this Forest during winter, so any level of thinning will not convert these stands to unsuitable condition.

The 1% PCT can occur in any stand age class in the Kettle Ponds and Brush Creeks LAUs in the Snowy Range until these LAUs reach 15% unsuitable habitat by management actions in 10 years. Once this 15% threshold is reached, there are 2 options. First, the remainder of the 1% PCT might not be extensive enough to convert more stands to unsuitable condition (≤25% tree cover), so PCT can proceed to 1%. Also, stands with tree height ≤ 6 ft. are already unsuitable habitat, so any level of thinning will not convert these stands to unsuitable.

The second option is that PCT beyond 15% in 10 years occurs in HFRA defined WUI and converts suitable habitat to an unsuitable condition. In this case, the acres treated would be counted toward the 3% WUI exemption because S2 would be exceeded. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres could be used for this situation.

The 1% PCT in the Blackhall, Little Snake, Diamond Park, and Red Elephant LAUs in the Sierra Madre Range will occur in stands that do not yet provide winter snowshoe hare habitat (S5, exception 5b) since these LAUs already exceed 30% unsuitable habitat. Or, this PCT must occur in HFRA defined WUI and be counted against the 13,214 acres of WUI treatment (3% WUI exemption) if this PCT occurs in stands considered winter snowshoe hare habitat regardless of whether the treated stand is converted to an unsuitable condition. When PCT occurs in HFRA defined WUI and the stands are converted to an unsuitable condition, then the treatment acres are also counted toward 30% unsuitable (S1) and 15% unsuitable in 10 years (S2).

The 1% PCT in the Battle Creek LAU can occur in any stand age class because the LAU will remain below 30% unsuitable for the LAVA project. However, all vegetation management in the LAU is expected to convert 24.6% of suitable habitat to an unsuitable condition in 10 years. Once the 15% unsuitable in 10 years threshold is reached, there are 2 options. First, the remainder of the 1% PCT might not be extensive enough to convert more stands to unsuitable condition (≤25% tree cover), so PCT can proceed to 1%. Also, stands with tree height ≤ 6 ft. are already unsuitable habitat, so any level of thinning will not convert these stands to unsuitable.

The second option is that PCT beyond 15% unsuitable in 10 years occurs in HFRA defined WUI and converts suitable habitat to an unsuitable condition. In this case, the acres treated would be counted toward the 3% WUI exemption because S2 would be exceeded. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres would be used for this situation.

The 1% PCT in the Upper Sierra Madre LAU can occur in any stand age class until the LAU reaches 30% unsuitable. Once the LAU reaches 30% unsuitable, there are 2 options. First, the remainder of the 1% PCT would be limited to stands that do not yet provide winter snowshoe hare habitat (S5, exception 5b).

The second option is that PCT beyond 30% unsuitable occurs in HFRA defined WUI and can either convert habitat to unsuitable or retain habitat as suitable. The acres treated would be counted toward the 3% WUI exemption in either case. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres would be used for this situation.

It is possible the Upper Sierra Madre LAU will reach 15% unsuitable in 10 years before it reaches 30% unsuitable because 1924 acres of private and state land could be treated in the next few years. In this

case, similar scenarios would be available. First, the remainder of the 1% PCT might not be extensive enough to convert more stands to unsuitable condition (≤25% tree cover), so PCT can proceed to 1%. Also, stands with tree height ≤ 6 ft. are already unsuitable habitat, so any level of thinning will not convert these stands to unsuitable.

The second option is that PCT beyond 15% unsuitable in 10 years occurs in HFRA defined WUI and converts suitable habitat to an unsuitable condition. In this case, the acres treated would be counted toward the 3% WUI exemption because S2 would be exceeded. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres would be used for this situation.

The PCT opportunities in the Hog Park LAU mimic the opportunities in the Upper Sierra Madre LAU. The 1% PCT in the Hog Park LAU can occur in any stand age class until the LAU reaches 30% unsuitable. Once the LAU reaches 30% unsuitable, there are 2 options. First, the remainder of the 1% PCT would be limited to stands that do not yet provide winter snowshoe hare habitat (S5, exception 5b).

The second option is that PCT beyond 30% unsuitable occurs in HFRA defined WUI and can either convert habitat to unsuitable or retain habitat as suitable. The acres treated would be counted toward the 3% WUI exemption in either case. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres would be used for this situation.

It is possible the Hog Park LAU will reach 15% unsuitable in 10 years before it reaches 30% unsuitable because 2002 acres of private and state land could be treated in the next few years. In this case, similar scenarios would be available. First, the remainder of the 1% PCT might not be extensive enough to convert more stands to unsuitable condition (≤25% tree cover), so PCT can proceed to 1%. Also, stands with tree height ≤ 6 ft. are already unsuitable habitat, so any level of thinning will not convert these stands to unsuitable.

The second option is that PCT beyond 15% unsuitable in 10 years occurs in HFRA defined WUI and converts suitable habitat to an unsuitable condition. In this case, the acres treated would be counted toward the 3% WUI exemption because S2 would be exceeded. The LAVA project will use 13,214 acres of WUI treatment exemptions and some of those acres would be used for this situation. Use of exemptions and exceptions will be monitored in the field and tracked annually by project.

LAVA project is consistent with the use of WUI exemptions and the exceptions to S5.

Standard VEG S6

Vegetation management projects that reduce winter snowshoe hare habitat in multi-story mature or late-successional conifer forests may occur only:

1. *Within 200 feet of administrative sites, dwellings or other infrastructure; or*
2. *For research studies or genetic tests evaluating genetically improved reforestation stock; or*
3. *For incidental removal during salvage harvest (skid trails); or*

4. *Where uneven-aged management (single tree or small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2, and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exception (skid trails).*

Exceptions and Exemptions

- *Exceptions 2 and 4 may not occur in any LAU in which VEG S1 is exceeded.*
- *Limitation for fuel treatment projects within wildland urban interface (WUI) that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forest).*

All LAUs in the Snowy Range and the Battle Creek LAU in the Sierra Madre Range can include treatment in winter hare habitat in old forest stands as part of single tree or small group uneven-aged management to promote multistory attributes (Exception 5). Each of these LAUs is currently below 30% unsuitable and will remain below 30% unsuitable with LAVA implementation.

The Upper Sierra Madre and Hog Park LAUs are currently below 30% unsuitable. Single tree or small group uneven-aged management (Exception 5) can occur in these LAUs until all vegetation treatments in these LAUs exceeds 30% unsuitable. Once an LAU exceeds 30% unsuitable, single tree or small group uneven-aged management to promote multistory attributes (Exception 5) is permitted only for treatments in HFRA defined WUI and are counted as part of the 13,214 acres of WUI treatments used for LAVA.

The Blackhall Mountain, Little Snake, Diamond Park, and Red Elephant Mountain LAUs currently exceed 30% unsuitable habitat primarily due to the insect/disease outbreak. Red Elephant Mountain LAU does not include any WUI in or near Wyoming. In the remaining LAUs, single tree or small group uneven-aged management to promote multistory attributes (Exception 5) is permitted only for treatments in HFRA defined WUI and are counted as part of the 13,214 acres of WUI treatments used for LAVA.

The single tree or small group uneven-aged management to promote multistory attributes treatments will be monitored in the field and tracked annually against the treatment acres identified in Table 3 column “LAVA Suitable Habitat Treatment (no exemption/exception needed)” and the columns for “Suitable Habitat WUI Treatments” to ensure this total does not exceed 13,214 acres for LAVA implementation.

LAVA project is consistent with the use of WUI exemptions and the exceptions to S5.

Incidental Damage (0.5% of some S5 and S6 exceptions)

Veg S5

Precommercial thinning may occur only:

1. *Within 200 feet of administrative sites, dwellings, outbuildings; or*
    2. *For research studies or genetic tree tests evaluating genetically improved reforestation stock; or*
    3. *For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or*
    4. *Based on new information that is peer reviewed and accepted by regional/state levels of the Forest Service and FWS where a written determination states*
        a. *That a project is not likely to adversely affect lynx; or*
        b. *That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat.*

Veg S6

Vegetation management projects that reduce winter snowshoe hare habitat in multi-story mature or late-successional conifer forests may occur only:

1. *Within 200 feet of administrative sites, dwellings or other infrastructure; or*
2. *For research studies or genetic tests evaluating genetically improved reforestation stock; or*
3. *For incidental removal during salvage harvest (skid trails); or*

The SRLA includes 6483 acres of exceptions to S5 and S6, listed above, for incidental removal of winter snowshoe hare habitat (Appendix B). There are 5786 acres remaining. Lava project will use half of these remaining exceptions (2893 acres). It is expected that implementation of precommercial thinning and multi-story mature or late successional conifer forest treatment for LAVA projects will also result in the reduction of 2893 acres of winter hare habitat. Use of these exceptions could occur in any LAU in the LAVA project. Use of these exceptions will be monitored with implementation of each project and tracked annually.

There will also be some incidental damage to snowshoe hare habitat that is not winter hare habitat. These are often groups of trees that do not protrude above the snow in winter but provide some cover during summer. Prescribed fire and mechanical treatments will reduce some of this habitat. Hand tool treatments will not affect this habitat. It is estimated that less than 3000 acres of incidental removal will occur while implementing LAVA treatments. This removal will be spread across the LAUs within the LAVA boundary and is not anticipated to have a noticeable effect on the snowshoe hare population available to lynx across the project area.

Guideline VEG G1

Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.

Some proposed vegetation management in the LAUs occurs in dead lodgepole stands. Mechanical and prescribed fire treatments occur in some other stands that have limited understory stem density. Treatment of these stands will promote a high density of lodgepole seedlings and, eventually saplings, that will provide some snowshoe hare habitat. Denning habitat is abundant in the project area and is often intermixed with winter snowshoe hare habitat.

Guideline VEG G4

Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.

No permanent roads are proposed for LAVA. All temporary roads needed for vegetation management will be obliterated following design criteria. No permanent firebreaks were identified for LAVA project.

Guideline VEG G5

Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.

Red squirrels often occupy stands with moderate to high tree mortality at a very low rate (Johnson et al. 2015). More than 48,000 acres in the LAVA project area have >41% tree mortality. So, red squirrels are probably very rare or absent from many of these stands. Stand regeneration is one of the desired conditions of the proposed actions. In several decades, regenerated stands will again provide red squirrel habitat. The LAUs still contain thousands of acres of red squirrel habitat that will not be treated under LAVA, more than 340,000 acres.

Guideline VEG G10

Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.

Some fuels treatments within the WUI will be shaded fuel breaks designed to reduce vegetation available as fuel but also provide shade to reduce surface temperatures

Guideline VEG G11

Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.

The insect/disease outbreak has created and will continue to create an abundance of denning habitat as snags fall over time. Denning habitat does not appear lacking. LAVA implementation will decrease denning habitat but denning habitat will remain in untreated areas and future denning habitat will be promoted where Forest Plan standards for retaining large, live recruitment trees, snags and coarse woody debris are applied. These standards apply outside of WUI areas.

DIRECT, INDIRECT, INTERRELATED, AND INTERDEPENDENT EFFECTS

Vegetation Management

Changes to lynx habitat in the LAUs as a result of LAVA implementation are displayed in Table 4. There will be up to 37,377 acres of treatment in currently unsuitable habitat. There will be up to 47,420 acres of conversion of suitable habitat to an unsuitable condition. This includes the 3% WUI treatments in LAUs that will or already exceed S1 or S2. These 47,420 acres also include the 2893 acres of incidental damage to winter snowshoe hare habitat that will occur with LAVA implementation. Mechanical treatment, prescribed fire, and hand tool use in vegetation management polygons, skid trails, landings, and temp roads account for these habitat changes.

Stand initiation treatment of stands already identified as currently unsuitable, those stands heavily impacted by the insect/disease outbreak, will have little impact to lynx. Main prey animals for lynx introduced into Colorado are snowshoe hares and red squirrels (Shenk 2007). Medium sized or larger live lodgepole pine trees provide habitat for red squirrels as shelter or cones for food. Dead and dying beetle affected trees no longer produce cones. Within a few years, falling limbs and needles no longer provide cover for shelters. So, removing these dead and dying trees will not remove habitat since it has been lost naturally. Red squirrels are much less likely occupy stands of medium or larger sized lodgepole trees after extensive beetle-kill (Saab et al. 2014, Johnson et al. 2015). Red squirrels will not use these stands for a few decades until an understory matures enough to produce cones abundantly and provide the cover for shelter protection.

Stand initiation treatment in stands identified as suitable habitat will convert these stands to unsuitable habitat. There will not be sufficient live vegetation remaining to provide year-round cover for snowshoe hares or cover and cone seed food for red squirrels. Stand initiation and associated temp roads, skid trails, and landings that convert habitat to an unsuitable condition will occur on 47,420 acres across 11

of the 12 LAUs in these two mountain ranges. There will be no suitable habitat treatment in the Red Elephant Mountain LAU since it is already over 30% unsuitable and there is no WUI on the Wyoming side of this LAU. This treatment level will cause 2 LAUs to exceed 30% unsuitable habitat and will increase unsuitable habitat in 3 LAUs that already meet or exceed 30% unsuitable. While this level of treatment follows allowances in the SRLA (USDA 2008), this is a substantial level of temporary habitat loss among the LAUs.

Within 30 years after any stand initiation treatments, the sapling and pole stands of lodgepole pine (mid-seral lodgepole pine) will develop, creating suitable wintering habitat for snowshoe hares (Murray 2001, Miller 2005, Ivan 2007). Vegetation development at this point in succession would be completely sufficient for hares to fully re-colonize the former treatment areas. Thus, these vegetation treatment areas represent a transient, but future snowshoe hare and other prey habitat. The treatment units will eventually result in snowshoe hare habitat and thus lynx foraging would improve in the management units. As explained by Koehler and Aubry (1994): "Lynx habitat in the western mountains consists of two structurally different forest types occurring at opposite ends of the stand age gradient. Lynx require early successional forests that contain high numbers of prey (especially snowshoe hares) for foraging and late successional forests that contain cover for kittens (especially deadfalls) and for denning [p. 86]."

Treatment of stands identified as currently unsuitable because they were harvested in recent decades could be treated with precommercial thinning. Snowshoe hare abundance is very low in young lodgepole stands (see USDA 2008). These regenerating stands are not yet tall enough to provide year-round snowshoe hare habitat. These stands would remain as currently unsuitable habitat after precommercial thinning. The already low snowshoe hare abundance will likely decrease more after precommercial thinning (Ivan et al. 2014) but density was already too low to be considered suitable habitat.

Depending on the tree height in stands receiving precommercial thinning, year-round snowshoe hare habitat could develop within 5 to 25 years of continued growth. Most often >25% canopy cover will be retained to provide sufficient year-round snowshoe hare horizontal cover. In a few cases, such as some WUI treatments, canopy cover could fall below 25%. These stands would not provide snowshoe hare habitat and would be tracked as continued unsuitable habitat.

Intermediate treatments will reduce the quality of snowshoe hare and red squirrel habitat in many cases but these areas will remain as suitable habitat for these lynx prey animals. Treatments will remove dead trees, dying trees, and live trees with insect or disease characteristics. Dead trees and resulting coarse woody debris and infected live trees contribute important components to lynx prey habitat.

Intermediate treatments will improve snowshoe hare habitat, especially, where individual tree removal or group selection are implemented to promote multi-story characteristics within a stand (following exception 4 of S6). The treated sites will return to year-round snowshoe hare habitat within 30 years. More importantly, however, these stands will be a component of improved multi-story habitat diversity in the larger area where dense horizontal cover was already lacking.

Across LAUs, implementation of most LAVA projects will temporarily eliminate or reduce the quality of prey habitat. Also, treatments in WUI areas are exempt from Forestwide standards to retain large, live recruitment trees, large snags, and coarse woody debris in treatment areas. A lack of these features in treatment areas will reduce the quality of lynx and prey habitat for several decades. Reductions in prey abundance or prey habitat could lead to decreased fitness, survival, or reproduction of individual lynx (USDI 2008, pp. 48, 50, 52, 66…).

Table 4. LAUs with LAVA Treatment Results.

LAU	Total Habitat	Existing Currently Unsuitable (%)	Unsuitable Habitat Available for Treatment in LAVA (in TOAs)	Assumed State and Private Suitable Habitat Treatment	Suitable Habitat Conversion to Unsuitable (includes 3% WUI Exemption)	Proposed 1% PCT Treatment	Resulting Unsuitable Habitat (%)	Resulting Unsuitable Habitat in 10 yrs. (%)
SNOWY RANGE								
Douglas Ck	49902	5796 (11.6)	4165	892	4580	499	11268 (22.6)	14.0
Snowy Range East	32697	3631 (11.1)	2858	0	4350	326	7981 (24.4)	14.3
Morgan	43081	4212 (9.8)	2958	701	5300	430	10213 (23.7)	14.0
Kettle Ponds	46891	3999 (8.5)	2955	2780	5950	468	12729 (27.1)	18.8
Brush Creeks	42877	3248 (7.6)	1965	1428	5840	378	10516 (24.5)	17.8
French Creek	43524	7086 (16.3)	4894	252	3850	385	11188 (25.7)	14.3

SIERRA MADRE RANGE								
Upper Sierra Madre	40557	3290 (8.1)	3123	1924	7834	405	13048 (32.2)	24.3
Battle Creek	35035	2156 (6.2)	1078	2936	4975	350	10067 (28.7)	24.6
Blackhall Mountain[2]	43532	16898 (38.8)	8550	725	532	351	18155 (41.7)	7.1
Hog Park[2]	37396	7184 (19.2)	4317	1011	4100	364	12295 (32.9)	16.3
Little Snake[2]	46462	13949 (30.0)	473	2	26	15	13977 (30.1)	2.2
Diamond Park[2]	35490	12290 (34.6)	29	191	83	4	12564 (35.4)	3.7
Red Elephant Mtn.[2]	38508	14063 (36.5)	7	0	0	3	14063 (36.5)	0.3
TOTALS	535,952	97,802	37,377	12,842	47,420	3978	158,064	

2 These LAUs also occur in Colorado. Treatment acres reflect only the portion in Wyoming

Noise, Commotion, or Other Disruption Effects

In the *Lynx Conservation Assessment and Strategy*, Ruediger *et al*. (2000) describe lynx as "…being generally tolerant of humans. Other anecdotal reports also suggest that lynx are not displaced by human presence, including moderate levels of snowmobile traffic [p. 1-13]." This perspective is shared by Ruggiero *et al*. (2000) who contend: "Lynx readily move across landscapes fragmented by conventional industrial forestry [p. 451]" and further, "limited anecdotal observations do not support the hypotheses that snowmobiling, ski touring, or hiking result in significant behavioral disturbance to lynx [p. 453]."

As importantly, lynx are less likely to be in or near activity areas during vegetation management or temporary road obliteration. The lower likelihood for lynx to be in the vicinity when these activities are in progress is due to two aspects of this cat's existence: 1), the inherent rarity of lynx on the landscape generally, and 2), its nocturnal tendency (which does not coincide with proposed daytime activities). The management actions in the LAUs and linkage corridors are distributed widely, will often occur in currently unsuitable habitat, will occur over 15 years, and lynx are rare on the landscape. Therefore, few disruptive impacts to lynx are anticipated from short-term noise, commotion or dust and smoke produced by proposed treatment actions.

With regard to exploitation or interference competition impacts postulated by Buskirk *et al.* (2000) to occur between lynx and coyotes, bobcats (*Lynx rufus*) or mountain lions (*Felis concolor*) in winter, no such impacts should occur as a result of proposed actions. Hypothetically, compaction of unconsolidated soft snow by over-snow machines could allow access of competing large carnivores into snowshoe hare habitats. In turn, Buskirk *et al.* (2000) suggest predation by these sympatric carnivores might detrimentally decrease hare numbers and thus impact the primary food resource lynx rely upon during winter. In a slightly differing opinion, USFS (2008) offered, "Research to date has not provided any conclusive evidence that snow compacting activities in lynx habitats are having adverse effects on lynx." However, even should competition occur between lynx and other large carnivore species in winter, proposed actions will not result in an increase in the amount of "groomed or designated over-the-snow routes". Moreover, the US Fish and Wildlife Service in the Biological Opinion for the SRLA reiterated:

"*In our 2000 and 2003 finding, we concluded there is no evidence that any competition may exist between lynx and other species that exerts a population-level impact on lynx. We also have no evidence that packed snow trails facilitated competition to a level that negatively affects lynx or lynx populations. However, extensive compacted conditions, in some situations, may result in the breakdown of the competitive advantage that lynx usually retain in deep snow environments. Widespread compaction of snow within a large portion of a lynx home range may result in adverse effects to lynx if the home range*

is functionally incapable of supporting lynx" (USDI 2008). Proposed actions will not result in any increase in areas of compacted snow.

Roads

Roads impact lynx through vehicle caused mortality and creating barriers to lynx movements. Most often, paved roads and associated high traffic volume and high speeds are responsible for vehicle caused lynx mortality and barriers (USDI 2008, p. 20, 55). No lynx has been killed on a road managed by the USFS in the Rocky Mountain Region (USDI 2008, p. 55). Forest roads rarely receive motorized use sufficient to impede lynx movements (USDI 2008, p. 55).

There are no permanent roads proposed under LAVA. There are no road upgrades proposed; gravel, paved, or even native surface. All 600 miles of temporary roads will be constructed to the lowest standard appropriate and completely obliterated within 3 years after their use. Since no permanent roads are proposed, no roads will be upgraded, and all temporary roads will be obliterated, road use for the LAVA project will not cause lynx mortality and will not impede lynx movement through LAUs, among LAUs, or across linkage corridors.

Connectivity

The SRLA includes a Habitat Connectivity Objective to maintain or restore habitat connectivity among LAUs and linkage areas (p. 5-1). Connectivity generally refers to large vegetation management projects, highway management, infrastructure development, and retaining habitat in public ownership (USDI 2008, BO p. 8). Roads can hinder connectivity and function of a landscape for a large carnivore such as a lynx. Generally, habitat fragmentation or isolation relative to lynx relate to "cumulative impacts from highways and residential and recreational development often tied to ski areas developed on National Forest System lands" (Hickenbottom et al. cited in USDA 2008) and the continued improvement of roads from "gravel roads….to highways" (USDA 2008). No permanent roads will be constructed for this project. LAVA treatments include 600 miles of temporary roads. Temporary roads will be not be open for public use. Temp roads will be obliterated to become part of the surrounding landscape. Obliteration will occur within 3 years of the completion of each vegetation management project.

Alexander et al. (2005) suggested traffic volumes between 3,000 and 5,000 vehicles per day may be the threshold above which successful crossings by carnivores are impeded. Since the lynx introduction in Colorado, 13 lynx mortalities have occurred where vehicular traffic volume ranged from 2,300 to >25,000 vehicles per day (Interagency Lynx Biology Team, 2013). No roads in the project area approach these traffic volumes. Authorized Forest roads rarely receive motorized use at levels that create barriers or impediments to lynx movements (USDI 2008, p.55).

Some proposed vegetation management was removed from consideration in the Battle Creek LAU in order to maintain this LAU below 30% unsuitable habitat and ensure that no more than 3 adjacent LAUs exceed 30% unsuitable. Several surrounding LAUs in the Sierra Madre Range exceed 30% unsuitable habitat primarily due to the insect/disease outbreak. Retention of suitable habitat in the Battle Creek LAU as a "bridge" among LAUs with fewer suitable habitat acres was one of the considerations for excluding some earlier proposed treatments. All LAUs in the Snowy Range will remain below 30% unsuitable. Over the long-term and at a larger scale, connectivity will not be impacted since no vegetation removal is permanent and subsequent regeneration will provide suitable habitat in time.

Neither of the linkage corridors is blocked by human alterations (USDI 2008, p. 36) and neither will be blocked by vegetation management in the linkage corridors. There is no proposal for residential development, ski area expansion, or highway expansion/construction.

Connectivity will be maintained.

Cumulative Effects

It is assumed that all suitable habitat on private and state lands within LAUs and linkage corridors in the LAVA project area will be converted to unsuitable habitat within the next 15 years. This assumption was subtracted from the total acres available for treatment under S1 and S2. Therefore, LAVA proposed actions in combination with the potential conversion of all suitable habitat on private and state lands will not result in the conversion of more suitable habitat to an unsuitable condition than identified in Table 4. Treatments will not exceed 13,214 acres of WUI exemptions, for example, based on the total potential unsuitable habitat for any LAU.

Incidental Take

The LAVA project is likely to result in incidental take in the form of harm to individuals (USDI 2008). On one hand, historic records, current wildlife surveys, and previous lynx tracking by Colorado Parks and Wildlife suggest that lynx are rare on the Forest and, if lynx occur on the Forest, they occur at a very low density. On the other hand, LAVA project will use 13,214 acres of exemptions (39.7% of the remainder), 3978 acres of the 1% PCT exceptions (32.7% of the remainder), and 2893 acres of the exception for incidental damage to winter snowshoe hare habitat (50% of the remainder). Direct effects to reproduction for individuals are possible. Some adult female lynx may fail to complete a pregnancy or might be less successful in finding adequate food to ensure maximum survival of kittens (USDI 2008, p. 76).

Potential for other direct mortality such as vehicle collisions is very low (USDI 2008, p. 55). Road characteristics, topography, and size of logging and other heavy equipment limit traffic speed. Connectivity of habitat within LAUs, among LAUs, and across linkage corridors will be maintained.

The Terms and Conditions identified in the BO (USDI 2008) will be followed. The LAVA project in conjunction with other projects on the Medicine Bow-Routt National Forests will not exceed the exemptions and exceptions for Standards VEG S1, S2, S5, or S6. Annual tracking of vegetation management projects across the Forests and annual reporting to US Fish and Wildlife Service ensures that these exemptions and exceptions are not exceeded. LAVA Proposed Action complies with the revised Forest Plan (USDA 2003), the SRLA (USFS 2008) and its exemptions and exceptions, and the BO (USDI 2008).

Determination of Effect and Rationale

The project occurs within lynx habitat and would affect lynx habitat as described, generally a reduction in snowshoe hare and red squirrel habitat. Habitat connectivity within LAUs, among LAUs, and across linkage corridors will be maintained. Treatment will occur in unsuitable habitat affected by the insect/disease outbreak, unsuitable habitat made unsuitable by previous recent treatments (i.e. precommercial thinning), and in suitable habitat. This treatment is expected to contribute to "a low level of impairment of reproduction and feeding during some years" (USDI 2008, p.76). It is anticipated that "some adult female lynx within home ranges affected by such projects may fail to complete a pregnancy or would be less successful in finding adequate food resources needed to ensure maximum survival potential for kittens", impairing reproduction and kitten survival (UDSI 2008, p.76). Proposed actions are consistent with the SRLA (USDA 2008), utilizing exemptions and exceptions for vegetation management.

For LAVA Proposed Actions, A **may affect, likely to adversely affect** determination is made for Canada lynx.

Responsibility for a Revised Biological Assessment

This Biological Assessment was prepared based on presently available information. If the action is modified in a manner that causes effects not considered, or if new information becomes available that reveals that the action may impact endangered, threatened, or proposed species in a manner or to an extent not previously considered, a new or revised Biological Assessment will be required or planned activities will be modified to be consistent with the amount of exemptions and exceptions addressed in this Biological Assessment.

Project Design Features

The following Design Features were selected from the complete list of LAVA project Design Features. These selected features are most relevant to promoting threatened or endangered species habitat. The complete list of Design Features is available in the Draft Environmental Impact Statement.

In consultation with wildlife staff, develop site-specific design criteria to ensure protection of boreal toad, wood frog, and northern leopard frog habitat and populations.

Fens: Treatment will not occur in fens. In addition, fens will be protected by a 300 foot limited action buffer in which heavy equipment use will be prohibited.

Wet Meadows: No operation of heavy equipment, direct ignition of prescribed fire, prescribed fire control line, tree felling or tree removal will occur in seasonally wet, herbaceous or shrub dominated wetlands, commonly referred to as wet meadows. Wet meadows may also contain trees, but do not include aspen woodlands or riparian gallery forests. Overall objective is no soil disturbance in these habitats.

Wetlands, Riparian Areas, and Aquatic Ecosystems: When treating within non-excluded wetlands (see Nos.1 and 1a), riparian areas, and aquatic ecosystems:

- Restrict temporary roads, landings, or main skid trails as agreed upon by project resource specialists.
- Hand fall and leave in place OR

Treat with mechanized equipment over a combined surface of 12 inches of frozen ground and snow.

Wetlands, Riparian Areas, and Aquatic Ecosystems: When treating within non-excluded wetlands (see Nos.1 and 1a), riparian areas, and aquatic ecosystems:

- Restrict temporary roads, landings, or main skid trails as agreed upon by project resource specialists.
- Hand fall and leave in place OR

Treat with mechanized equipment over a combined surface of 12 inches of frozen ground and snow.

Prior to working within WIZ buffers resource specialists would conduct an assessment to determine site-specific design criteria for the retention of CWD.

Rare Plants: Threatened, Endangered, R2 Sensitive and local concern plant species will be subject to a limited action buffer (typically 30 to 100 feet), in which heavy equipment will be prohibited and other treatment activities may be limited, unless otherwise agreed upon by the botanist and District Ranger. Specific buffer distances will depend and plant and habitat characteristics and will be determined at time of discovery.

Meadows: Use of heavy equipment is prohibited in meadows and grasslands unless no other option is available. If heavy equipment use cannot be located outside these areas, Forest Service resource

specialists would be contacted prior to implementation to determine whether additional surveys are needed or special requirements are warranted to protect site integrity.

Pollinators: In consultation with Forest Resource Specialists, conduct vegetation management activities in a manner that protects or enhances pollinator habitat. The Pollinator-Friendly BMPS for Federal Lands (draft, May 2015) will be used as a guide.

Prescribed Burns: Manage prescribed burns to promote native species and to hinder weed species germination. Prior to implementation, field conditions will be assessed to locate areas with existing infestations of weeds. Areas may be excluded from prescribed burning where there are infestations of fire-proliferating species (i.e. cheatgrass and musk thistle). Weed-prone areas included in burns will be treated with appropriate herbicides or other control methods, as needed, to minimize the spread of weed species post-treatment.

Allow management activities to result in no more than 15% of an activity area to have detrimental soil displacement, puddling, compaction, and/or to be severely burned.

Prohibit soil-disturbing activities on slopes greater than 60% and on soils susceptible to high erosion and geologic hazard. Site specific measures will be developed if these features cannot be avoided.

Maintain, at a minimum, 60% effective ground cover throughout project implementation to provide for long-term levels of organic matter and nutrients and to provide for erosion control.

If project includes operation of heavy equipment on slopes greater than 40% site-specific protection measures will be developed.

Equipment operation (except where the ground can be appropriately stabilized), will only occur when soils are capable of supporting equipment without incurring detrimental compaction, puddling, or rutting.

Designated skid trails would be used in any material removal. Where feasible, skid trails, and landings from past harvests are to be utilized to minimize surface area impacted. Soil resources within the project area should not be subjected to vehicle or surface disturbance when soils are extremely dry or wet. If ruts develop that are 6 inches deep harvest activity should stop unless the surface can be appropriately stabilized.

On primary skid trails crossing slopes greater than 10 percent, minimize topsoil disturbance and slow overland water flow with slash, construction mats, or use of similar erosion control methods.

Avoid wet portions of stands during harvest implementation or use protective measures, such as use of slash mats, to avoid soil impacts. If wet soils are found during implementation, hydrologist/soil scientist will field-verify and delineate a hydric soil boundary.

To reduce the risk of detrimentally burned soils and increased erosion potential, prescribed fire should be applied when soil conditions provide for minimum soil burn severity while meeting burn objectives

(i.e.: higher humidity, lower temperatures, higher soil moisture content, higher fuel moisture content, mosaic burn).

Due to the susceptibility of soil loss following fire, prescribed fire use should be limited to low severity burns and less than 60% total ground surface area burned on south facing slopes on slopes greater than 55%.

Vegetation management and ground disturbing actions that are within ¼ mile of suitable goshawk nesting habitat will be surveyed using accepted protocol (Joy et al. 1994) between June 19 and August 4 of the year prior to actions or the year actions are expected to occur. Where active nests or territories are identified, these Forest Plan standards will apply (USDA 2003a).

Outside of WUI, vegetation management actions will be designed to retain or promote unique features for overstory and understory diversity if feasible. These unique features can include items such as snags, uncommon trees, or woody debris.

No treatment will occur in suitable habitat for the **Preble's meadow jumping mouse**. Suitable habitat (614 acres) occurs along the Laramie River at 7800 ft elevation and lower in Township 13 North, Range 77 West, section 33 and Township 12 North, Range 77 West, section 04.

Temporary Roads

Re-contour temporary road template to the original contour to permit normal maximum flow of water.

Remove culverts, install water bars and restore stream channels to near natural dimensions.

For the entire length of the temp road provide 35%-65% ground cover by scattering debris on the route footprint. Ground cover range is provided to account for different harvest methods and project objectives.

Rip or otherwise roughen the length of the temporary road prism to eliminate compaction, ensuring an average depth of 6"-12", as needed, to remove compaction. Straight furrow lines are not acceptable as they act as conduits for water transport and do not eliminate compaction within the entire prism. The intent is to remove the temporary road prism from the landscape so hydrologic function is restored to the area, to reduce bulk density, increase infiltration, and to provide a seedbed for vegetation

Temporary road obliteration methods will be designed to effectively prevent motorized vehicle use by utilizing berms, boulders, slash, mulch and/or dead trees. The obliteration method(s) selected will cover the temporary road for the sight distance from the origin of the temporary road. For the entire length of the temp road, provide 35%-65% ground cover by scattering debris on the route footprint.

Complete obliteration of temporary roads will occur within 3 years after the unit has been accepted/operations completed.

Skid trails and landings will be rehabilitated as needed to minimize soil and hydrologic effects. Site-specific measures will be developed at time of implementation.

If treatment in Old Growth is planned, replacement acres will be identified prior to implementation, per Forest Plan Biological Diversity Standard 1. Vegetation management can be conducted within these stands as long as treatments maintain or promote characteristics of old growth stands, new stands are identified that meet the requirements of old growth and are incorporated into the Forests old growth strategy.

Alternative 1 - No Action

Direct, Indirect, Interrelated, and Interdependent Effects

Under the no action alternative, there are few impacts to lynx, as no human-influenced vegetation management activity would occur. The main natural factor influencing lynx habitat is the insect/disease outbreak. Lodgepole stands with high mortality exist as currently unsuitable habitat for 10 to 25 years. The beetle outbreak affected the population dynamics of the lynx's primary and main alternate prey species, the snowshoe hare and red squirrel. Where canopy cover and horizontal structure declined, red squirrel and snowshoe hare abundance will decline.

Through time, a patchy distribution of course woody debris (both standing dead and down trees), newly regenerating trees, and accelerated growth of advanced regeneration is developing across the landscape. Many areas would improve in quality as jackstraw piles form, root wads are exposed, more coarse woody debris becomes available for denning, and tree regeneration and growth of advanced regeneration (Dhar et al. 2016, Malcolm 2012) produce year-round snowshoe hare habitat. Red squirrel habitat will develop and improve over several more decades as trees provide more canopy cover and cone production increases.

Suitable habitat will also improve in quality in many areas. The beetle-killed trees in these stands will increase coarse woody debris available for denning sites as the snags fall over time. Understory productivity will increase, advanced regeneration growth rate will increase, and subalpine fir trees will become a larger component of these stands (Dhar et al. 2016, Malcolm 2012). Subalpine fir trees have limbs that reach to the ground, providing snowshoe hare cover. In comparison, maturing lodgepole pine trees lose ground level limbs.

The accumulation of woody debris and increase of subalpine fir could increase the probability of wild fires at certain time periods in the future. On the other hand, the return of aspen to many of these stands can partially counteract the fire threat from firs (Malcolm 2012). There is currently vigorous scientific debate about the influence of bark beetle killed trees to wild fires (Wells 2012). Moreover, the geographic extent and severity of wild fires is determined by many climatic factors, vegetation conditions, topography, and local weather conditions. It is difficult to predict wild fire impacts to lynx habitat in the future.

Cumulative Effects – No Action

It is assumed that all suitable habitat on private and state lands in LAUs in the project area will be converted to an unsuitable condition. This would total 12,842 acres (Table 4).

COMPLIANCE WITH REGULATORY DIRECTION

LAVA Proposed Action complies with the revised Forest Plan (USDA 2003), the SRLA (USFS 2008), and the BO (USDI 2008) for the SRLA.

REFERENCES

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APPENDIX A

LAVA PROPOSED ACTION DEFINITIONS

95,000 acres

Stand initiation structural stage-This stage immediately follows the stand-replacing disturbance. Regeneration of open space from seed, sprouts and advanced regeneration occurs. Generally one age class of trees. The stage ends when tree canopy becomes continuous and trees begin to compete with each other for light and canopy space.

The following activities will take place when conditions of the stand meet set parameters. Mortality of greater than 50%, and/or moderate to high levels of insect and diseases, or stands have reached culmination of mean annual increment.

Clearcut -This treatment removes all the trees from the stand producing a fully exposed microclimate for the development of a new age class.

Coppice cut – A treatment for aspen stands that removes all of the trees from the stand and the majority of the regeneration that occurs is from sprouts or root suckering

Stand replacing prescribed fire – This treatment kills all or most of the living canopy (in a forest or woodland, trees) producing a full exposed microclimate and initiates succession or regrowth.

Final shelterwood removal cut – This treatment is a final removal cut that releases established regeneration from the competition with the overwood after there is no longer a need for shelter under the shelterwood regeneration method.

Seed tree cut (Preparatory) – This treatment removes trees to enhance conditions for seed production and/or develop windfirmness for a future seed-tree seed cut.

Seed tree cut (final)– This treatment is a final removal cut that releases established regeneration from competition with seed-trees after they are no longer needed for seed under the seed tree regeneration method.

Overstory removal – This treatment removes trees constituting an upper canopy layer to release understory trees. The primary source of regeneration is advance reproduction.

Two-aged clearcut – This treatment is a two –aged regeneration harvest that removes sufficient trees to produce an exposed microclimate for the development of a new age class.

Two age Coppice cut – A treatment for aspen stands that removes the majority of trees from a stand, leaving at least 10%, and the majority of the regeneration that occurs is from sprouting or root suckering.

Stands within the suitable timber base of the Medicine Bow Routt National Forest are subject to 5 year stocking standards. 5 years after completion of the final treatment these areas need to be assured that restocking of created openings can be restocked to Forest Plan identified minimum stocking levels. The restocking of these openings is often accomplished through natural regeneration. If within 5 years natural regeneration does not meet the minimum stocking standards planting of desirable seedlings can occur. Harvested areas outside of the suitable timber base may be exempted from the 5-year stocking standard if the openings meet one of the following Forest Plan direction.

a. For permanent openings that serve specific management direction.
b. Where provided for in specific management practices and prescriptions.
c. Where it is desirable to delay regeneration and crown closure to meet specific desired conditions and management objectives.
(Standard 4, p.1-37)

165,000 acres

Shelterwood/Intermediate/Uneven-aged treatments

The following activities will take place when conditions of the stands meet set parameters. Mortality 30-49%, and/or stand with low levels of insects and diseases.

Shelterwood- A method of regenerating an even-aged stand in which a new age class develops beneath the moderated microenvironment provided by the residual trees. The sequence of treatments can include three distinct types of cuttings: (1) an optional preparatory cut to enhance conditions for seed production; (2) an establishment cut to prepare the seed bed and to create a new age class; and (3) a removal cut to release established regeneration from competition with the overwood. Cutting may be done uniformly throughout the stand (Uniform Shelterwood), in groups or patches (Group Shelterwood), or in strips (Strip Shelterwood). Step three, removal cut falls into the 95,000 acres of stand initiation structural stage group.

Shelterwood Preparatory Cut/Establishment cut – This treatment removes some overstory trees except those needed for the purposes of shelter or seed production. Prepares the seed bed and creates a new age class in a moderated microenvironment.

Intermediate treatments- A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest. Intermediate treatments are commonly prescribed by professional foresters to improve species composition and wildlife habitat; regulate stand density; increase mast production; enhance timber quality and forest health; and promote and establish desirable advance regeneration.

Thinning-The objectives of a thinning treatment vary depending upon the objective of the stand the treatment is being applied to. Thinning objectives may include promote a healthier stand, reduce forest fuels associated with high severity wildfires, produce future sawtimber and/or create conditions suitable

to meet future wildlife habitat such as old growth forest. For example, a stand with an objective to improve wildlife habitat, could be thinned by removing trees that do not provide desired habitat characteristics and would also increase growth of the remaining trees.

Sanitation- The objective of a sanitation treatment is to remove trees infected with undesirable insects or diseases to reduce the likelihood from the insects or diseases spreading to other trees in the stand. After treatment a full stocked stand with a reduced amount of insects and diseases is remaining.

Salvage - The objective of a salvage treatment is to harvest trees that have experienced mortality/damage by a fire, flood, wind event, insects and diseases or other natural disaster.

Improvement cut- The objective of an improvement cut is to harvest less than desirable trees of any species in a stand of poles or larger trees, primarily to improve the composition and quality.

Liberation cut- The objective of a liberation cut is to remove older overtopping trees that are competing with desired sapling trees.

Release and Weed- The objective of a release and weed treatment is to remove undesirable competing vegetation from stands of young desirable trees.

Non-stand replacing prescribed fire- Broadcast burning, jackpot burning; This treatment is a prescribed burning activity where fire is applied to most or all of an area (broadcast burning), or concentrations of fuels (jackpot burning), within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both. These types of prescribed fire are not designed to kill the overstory, however, areas of mortality in the overstory can occur. Jackpot burning usually results in a mosaic burn pattern where broadcast burning affects the majority of the vegetation within the treatment area.

Uneven-aged treatments- Methods of regenerating a forest stand, and maintaining an uneven-aged structure, by removing some trees in all size classes either singly, in small groups, or in steps.

Group selection – The objective of a group selection cut is to cut small groups within stands to establish new age classes. The width of groups is commonly less than approximately twice the height of the mature trees. Individual trees in the matrix (outside of groups) may or may not be harvested to provide improved growing conditions for the remaining trees.

Single tree selection – The objective of a single tree selection cut is to uniformly remove individual trees of all size classes throughout a stand creating or maintain a multiage structure to promote the growth of remaining trees and to provide space for regeneration.

100,000 acres

Green tree/ shrub and grassland treatments – The following activities will take place within shrublands and grasslands regardless of mortality and insect and disease levels. In treed areas these activities will generally take place in stands that have less than 30% mortality.

Conifer removal (from aspen, shrublands or meadows) – The objective of a conifer removal treatment is to remove conifers from aspen, shrublands or meadow areas where large numbers of conifers have not historically occurred and/or to enhance aspen stands, shrublands or meadows by freeing up growing space that conifers are occupying.

Mountain shrub and sagebrush treatment – The objective of this treatment is to reduce shrub cover in stands of dense or decadent shrub cover with prescribed fire or mechanical methods. Treatment will increase age class diversity of shrubs, create a greater mosaic of openings within the shrub canopy, and promote increased cover and production of grasses and forbs. The Greater Sage-grouse Record of Decision for Northwest Colorado and Wyoming will be followed in areas designated as Greater sage-grouse habitat.

Grass and forb treatment – The objective of this treatment is to remove decadent areas of grass and forbs and increase grass and forb production. This treatment is mostly accomplished using prescribed burning techniques however mechanical means can be used such as mowing and targeted grazing.

Coppice cut (aspen enhancement) – This treatment removes all of the trees from the stand and the majority of the regeneration that occurs is from sprouts or root suckering

Two age Coppice cut (aspen enhancement) – This treatment removes the majority of trees from a stand, leaving at least 10%, and the majority of the regeneration that occurs is from sprouting or root suckering.

Thinning-The objectives of a thinning treatment vary depending upon the objective of the stand the treatment is being applied to. Thinning objectives may include promote a healthier stand, reduce forest fuels associated with high severity wildfires, produce future sawtimber and/or create conditions suitable to meet future wildlife habitat such as old growth forest. For example, a stand with an objective to improve wildlife habitat, could be thinned by removing trees that do not provide desired habitat characteristics and would also increase growth of the remaining trees.

Sanitation- The objective of a sanitation treatment is to remove trees infected with undesirable insects or diseases to reduce the likelihood from the insects or diseases spreading to other trees in the stand. After treatment a full stocked stand with a reduced amount of insects and diseases is remaining.

Salvage - The objective of a salvage treatment is to harvest trees that have experienced mortality/damage by a fire, flood, wind event, insects and diseases or other natural disaster.

Improvement cut- The objective of an improvement cut is to harvest less than desirable trees of any species in a stand of poles or larger trees, primarily to improve the composition and quality.

Liberation cut- The objective of a liberation cut is to remove older overtopping trees that are competing with desired sapling trees.

Release and Weed- The objective of a release and weed treatment is to remove undesirable competing vegetation from stands of young desirable trees.

Shelterwood Preparatory Cut/Establishment cut – This treatment removes some overstory trees except those needed for the purposes of shelter or seed production. Prepares the seed bed and creates a new age class in a moderated microenvironment.

Non-stand replacing prescribed fire- Broadcast burning, jackpot burning; This treatment is a prescribed burning activity where fire is applied to most or all of an area (broadcast burning), or concentrations of fuels (jackpot burning), within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both. These types of prescribed fire are not designed to kill the overstory, however, areas of mortality in the overstory can occur. Jackpot burning usually results in a mosaic burn pattern where broadcast burning affects the majority of the vegetation within the treatment area.

SLASH TREATMENTS- For all treatment types slash treatments may include: prescribed burning, lop and scatter, machine/hand pile and burn, mastication, machine trampling or roller chopping. Slash treatments will be determined before or post-harvest/vegetation management based upon ground conditions, silvicultural and other objectives of the treatment. Within identified WUI areas or areas that have a fire concern most slash will be removed from the unit either by harvesting techniques, such as whole tree skidding, mastication, or be piled following vegetation treatment for later burning. Slash treatment outside of fire concern areas will often leave most of the slash in treatment areas. Within these treatment areas slash could be lopped and scattered, machine trampled, roller chopped or other method that leaves slash in place but condensed by hand or mechanized equipment. Leaving slash in place can increase favorable microsite conditions for regeneration of tree species, increase nutrient cycling, reduce sediment transportation, increase soil moisture and address other resource concerns.

Removal of trees, shrubs could take place using mechanical methods such as but not limited to; chainsaws, harvesting machinery, mastication equipment or bull dozers.

Wildland Urban Interface (WUI) areas/Fuels treatments- Within identified WUI areas fuels treatments are the highest priority therefore silvicultural prescriptions will be developed to primarily achieve fuels objectives using all of the listed treatments types regardless of percentages of mortality or insect and disease occurrence.

Adaptive Mgmt. Treatment Option	Regeneration Objective	% Overstory Removal	Current Mortality	CMAI	Current Insect and Disease level
Stand Initiation					
Clearcut	Yes (even-aged)	Up to 100%	50-100%	Yes	Moderate -High
Coppice	Yes (even-aged)	Up to 100%	50-100%	n/a	Moderate -High
Stand replacing RX	Yes (even-aged)	Up to 100%	50-100%	n/a	Moderate -High
Final shelterwood Removal	Yes (even-aged)	Up to 100%	50-100%	n/a	Moderate -High
Seed tree cut (prep)	Yes (even-aged)	Up to 100%	50-100%	n/a	Moderate -High
Overstory removal	Yes (even-aged)	Up to 100%	50-100%	n/a	Moderate -High
Two-aged clearcut	Yes (even-aged)	Up to 90%	50-100%	n/a	Moderate -High
Two-aged coppice cut	Yes (even-aged)	Up to 90%	50-100%	n/a	Moderate -High

Intermediate/Uneven-aged					
Shelterwood prep cut	Yes (even-aged)	Up to 40%	30-49%	n/a	Low-Moderate
Shelterwood establishment cut	Yes (even-aged)	Up to 80%	30-49%	n/a	Low-Moderate
Thinning	No	varies	30-49%	n/a	Low-Moderate
Sanitation	Not Usually but may occur	varies	30-49%	n/a	Low-Moderate
Salvage	Not Usually but may occur	varies	30-49%	n/a	Low-Moderate
Improvement cut	No	<30%	30-49%	n/a	Low-Moderate
Liberation cut	No	Up to 100%	30-49%	n/a	Low-Moderate
Release and weed	No	<30%	30-49%	n/a	Low-Moderate
Non-stand replacing prescribed fire	Possible	<30%	30-49%	n/a	Low-Moderate
Group selection	yes (uneven-aged)	100% in groups	30-49%	n/a	Low-Moderate
Single tree selection	yes (uneven-aged)	<30%	30-49%	n/a	Low-Moderate

Adaptive Mgmt. Treatment Option	Regeneration Objective	% Overstory Removal	Current Mortality	CMAI	Current Insect and Disease level
Green tree/Shrub land and Grassland					
Conifer removal (from aspen, shrub land or meadows)	No	Varies	n/a	n/a	n/a
Mountain shrub and sage brush treatment	Varies	n/a	n/a	n/a	n/a
Grass and forb treatment	Yes	n/a	n/a	n/a	n/a
Coppice cut	Yes (even-aged)	Up to 100%	<30%	n/a	n/a
Two age Coppice cut	Yes (even-aged)	Up to 90%	<30%	n/a	n/a
Shelterwood prep cut	Yes (even-aged)	Up to 40%	<30%	n/a	Low-Moderate
Shelterwood establishment cut	Yes (even-aged)	Up to 80%	<30%	n/a	Low-Moderate
Thinning	No	varies	< 30%	n/a	Low-Moderate
Sanitation	Not Usually but may occur	varies	< 30%	n/a	Low-Moderate
Salvage	Not Usually but may occur	varies	< 30%	n/a	Low-Moderate
Improvement cut	No	<30%	< 30%	n/a	Low-Moderate
Liberation cut	No	Up to 100%	< 30%	n/a	Low-Moderate
Release and weed	No	<30%	< 30%	n/a	Low-Moderate
Non-stand replacing prescribed fire	Possible	<30%	< 30%	n/a	Low-Moderate
Group selection	yes (uneven-aged)	100% in groups	< 30%	n/a	Low-Moderate
Single tree selection	yes (uneven-aged)	<30%	< 30%	n/a	Low-Moderate

APPENDIX B

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Colorado Field Office

Ecological Services

P.O. Box 25486, DFC (65412)
Denver, Colorado 80225-0486

IN REPLY REFER TO:
ES/CO: USFS/MBR NF

Tails: 06E24000-2018-TA-0341

Mr. Russel Bacon

Forest Supervisor

Medicine Bow–Routt National Forests and Thunder Basin National Grassland

2468 Jackson Street

Laramie, Wyoming 82070

Dear Mr. Bacon:

The U.S. Fish and Wildlife Service (Service) received your letter and process paper on

December 19, 2017, regarding the 2017 update of the Medicine Bow-Routt National Forests (MBR) Lynx Habitat Mapping Process Paper. Your letter requested that the Service provide an approval for the updated 2017 changes to Canada lynx (*Lynx canadensis*) habitat mapping on the MBR as recommended in the process paper. The following comments have been prepared under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C 1531 et. seq.), and the Interagency Cooperation Regulations (50 CFR 402).

The proposed changes to mapping to lynx habitat mapping are necessary following changes to the FSVeg Spatial Database. The database was recently updated to account for forest changes as a result of the mountain pine beetle epidemic, spruce bark beetles, sudden aspen

decline, and wildfires. The MBR used innovative remote sensing tools to update FSVeg Spatial data, which were field verified using stand exams and other field-based techniques.

The 2017 habitat mapping update provides minor changes to the acres of mapped lynx habitat on the MBR but does not propose changes to Lynx Analysis Units (LAUs) or lynx linkage areas. The new 2017 maps appear to provide a more accurate depiction of the movement of the mountain pine beetle epidemic within the MBR. Under the current mapping, 13 LAUs have exceeded the VEG S1 standard (i.e., no more than 30 percent of the lynx habitat in the LAU in a currently unsuitable condition).

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The 2017 lynx habitat mapping update provides a revision to the acres available for exemptions and exceptions under the Southern Rockies Lynx Amendment (SRLA) of 2008. These values are provided in the following table:

SRLA Standards with exemptions and exceptions	**Cap (%)**	**2011 Mapping (acres)**	**2017 Mapping (acres)**	**SRLA project tracking since 2009 (acres treated)**
VEG S1, S2, S5, S6 WUI Exemption	3%	38,819	38,901	5,648
VEG S5 Exception 5	1%	12,940	12,967	763
VEG S5, S6 Exception	0.5%	6,470	6,483	697

Thank you for the opportunity to review your updated lynx habitat mapping and to review the updated FSVeg database methodology for analyzing forest-wide mortality.

The Service is pleased to provide our approval for the lynx habitat mapping changes provided in your process paper. The Service recognizes the considerable effort that was involved by the MBR team, as well as the USFS Regional Office, in this process. This effort is consistent with the conservation recommendation in the Southern Rockies Lynx Amendment Biological Opinion, which states that "[t]he Forest Service and the Service will continue to jointly update the lynx habitat maps within the SRLA area."

If the Service can be of further assistance, please contact Leslie Ellwood at (303) 236-4747 of the Colorado Field Office.

Sincerely,

02/22/2018

Ann Timberman

Drue DeBerry

for Colorado and Nebraska Field Supervisor

Cc: COFO-GJ (K. Broderdorp)

WYFO (L.

Reference: Lynx Habitat Mapping and Criteria|USFS_MBR_Lynx Habitat Mapping Process Paper_2017 update_FWS approval

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APPENDIX C

Strategy for Conversion of suitable habitat to unsuitable condition in each LAU:

1. Retain LAUs below 30% unsuitable habitat (Southern Rockies Lynx Amendment Standard 1 (S1)) when possible in order to account for treatment on state and private land, account for treatment on FS due to wildfire suppression needs, allow some harvest of green tree (live) stands outside of HFRA defined WUI, allow some uneven-aged management (S6), avoid more than 3 adjacent LAUs from exceeding 30% unsuitable (S1, otherwise lose the 3% HFRA defined WUI treatment exemption), and allow precommercial thinning at any desired age class (S5, 1%).

2. Retain LAUs below 15% unsuitable in 10 years (S2) when possible in order to account for treatment on state and private land, account for treatment on FS due to wildfire suppression needs, and allow some harvest of green tree (live) stands outside of HFRA defined WUI.

Snowy Range

Douglas Ck LAU – Recommendation meets strategies 1 and 2 above. Suggests treating 4580 acres of suitable habitat to address 0.5 mile buffer around private lands (HFRA WUI). Treatment does not use any of the 3% HFRA defined WUI exemption since 963 more acres will be available by 2022 to stay below 15% unsuitable in 10 years. Treatment would also be below 30% converted to unsuitable.

Precommercial thinning (PCT) of 1% of LAU habitat can occur in any age class since this LAU will remain below 15% unsuitable by management actions in 10 years and below the 30% unsuitable habitat total. Some stands available for PCT are already unsuitable (≤6 ft. tall), so there would be no conversion to unsuitable habitat. If the PCT converts a stand to unsuitable condition (≤25% tree cover), then these acres will also contribute to the Standards Veg S1 and Veg S2 tracking of unsuitable acres.

Snowy Range East LAU - Recommendation meets strategies 1 and 2 above. Suggests treating 665 acres of suitable habitat to address 0.5 mile buffer around private lands (HFRA WUI). Adds an additional 3685 acres of suitable habitat harvest, resulting in 4350 acres of harvest in suitable habitat. Treatment does not require use of any of the 3% HFRA defined WUI exemption since total suitable habitat harvest would be below 30% converted to unsuitable and <15% converted to unsuitable in 10 years.

Precommercial thinning (PCT) of 1% of LAU habitat can occur in any age class since this LAU will remain below 15% unsuitable by management actions in 10 years and below the 30% unsuitable habitat total. Some stands available for PCT are already unsuitable (≤6 ft. tall), so there would be no conversion to unsuitable habitat. If the PCT converts a stand to unsuitable condition (≤25% tree cover), then these acres will also contribute to the Standards Veg S1 and Veg S2 tracking of unsuitable acres.

Morgan LAU - Recommendation meets strategies 1 and 2 above. Suggests treating 2042 acres of suitable habitat to address 0.5 mile buffer around private lands (HFRA WUI). Adds an additional 3258 acres of suitable habitat harvest, resulting in 5300 acres of harvest in suitable habitat. Treatment does not require use of any of the 3% HFRA defined WUI exemption since total suitable habitat harvest would be below 30% converted to unsuitable and <15% converted to unsuitable in 10 years.

Precommercial thinning (PCT) of 1% of LAU habitat can occur in any age class since this LAU will remain below 15% unsuitable by management actions in 10 years and below the 30% unsuitable habitat total. Some stands available for PCT are already unsuitable (≤6 ft. tall), so there would be no conversion to unsuitable habitat. If the PCT converts a stand to unsuitable condition (≤25% tree cover), then these acres will also contribute to the Standards Veg S1 and Veg S2 tracking of unsuitable acres.

Kettle Ponds - Recommendation meets strategy 1 above. Recommendation does not meet strategy 2 above because more than 15% of suitable habitat would be converted to unsuitable habitat in 10 years in order to treat all 5950 acres of suitable habitat within 0.5 miles of private land (HFRA WUI). Suggests treating 4159 acres of suitable habitat plus 1791 acres of the suitable habitat HFRA defined WUI 3% exemption (5950 acres total) in order to address 0.5 mile buffer around private lands.

Since recommendation stays below 30% unsuitable, can still accomplish 1% precommercial thinning (PCT) of any age class until LAU reaches 15% unsuitable in 10 years. When the 15% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) would occur in stands where thinning is not extensive enough to convert the stands to unsuitable condition (≤25% tree cover) or stands are already considered unsuitable. Stands with tree height ≤ 6 ft. are already unsuitable. If additional thinning does convert stands to unsuitable condition (≤25% tree cover), this PCT will occur in CWPP or HFRA WUI and use the 3% WUI exemption (because LAU already exceeded the 15% unsuitable in 10 years).

Brush Creeks - Recommendation meets strategy 1 above. Recommendation does not meet strategy 2 above because more than 15% of suitable habitat would be converted to unsuitable habitat in 10 years in order to treat all 5320 acres of suitable habitat within 0.5 miles of private land (HFRA WUI) and treat some of the 2008 acres of additional WUI identified in the County Community Wildlife Protection Plan. Suggests treating 4640 acres of suitable habitat plus 1200 acres of the suitable habitat HFRA defined WUI 3% exemption (5320 acres total) in order to address 0.5 mile buffer around private lands.

Since recommendation stays below 30% unsuitable, can still accomplish 1% precommercial thinning (PCT) of any age class until LAU reaches 15% unsuitable in 10 years. When the 15% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) would occur in stands where thinning is not extensive enough to convert the stands to unsuitable condition (≤25% tree cover) or stands are already considered unsuitable. Stands with tree height ≤ 6 ft. are already unsuitable. If additional thinning does convert stands to unsuitable condition (≤25% tree cover), this PCT will occur in CWPP or HFRA WUI and use the 3% WUI exemption (because LAU already exceeded the 15% unsuitable in 10 years).

French Creek - Recommendation meets strategies 1 and 2 above. Suggests treating 2148 acres of suitable habitat to address 0.5 mile buffer around private lands (HFRA WUI). Adds an additional 1702 acres of suitable habitat harvest, resulting in 3850 acres of harvest in suitable habitat. Treatment does not require use of any of the 3% WUI exemption since total suitable habitat harvest would be below 30% converted to unsuitable and <15% converted to unsuitable in 10 years.

Precommercial thinning (PCT) of 1% of LAU habitat can occur in any age class since this LAU will remain below 15% unsuitable by management actions in 10 years and below the 30% unsuitable habitat total. Some stands available for PCT are already unsuitable (≤6 ft. tall), so there would be no conversion to unsuitable habitat. If the PCT converts a stand to unsuitable condition (≤25% tree cover), then these acres will also contribute to the Standards Veg S1 and Veg S2 tracking of unsuitable acres.

Sierra Madre Range

Upper Sierra Madre - Recommendation does not meet strategies 1 or 2 above. More than 30% of the lynx habitat will be in unsuitable condition and more than 15% of suitable habitat would be converted to unsuitable habitat in 10 years in order to treat all 7834 acres of suitable habitat within 0.5 miles of private land (HFRA WUI). Suggests treating 4052 acres of suitable habitat plus 3782 acres of the suitable habitat HFRA defined WUI 3% exemption (7834 acres total) in order to address 0.5 mile buffer around private lands.

Can accomplish PCT of any age class (1%) until LAU reaches 15% unsuitable in 10 years or 30% unsuitable. If either threshold is reached, can still accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption. If the 15% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) could occur where thinning is not extensive enough to convert the stands to unsuitable condition (≤25% tree cover) or total tree height ≤ 6 ft. Stands with tree height ≤ 6 ft. are already unsuitable. If the 30% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) would occur only in stands that do not yet provide winter hare habitat.

Battle Creek - Recommendation meets strategies 1 above. Recommendation does not meet strategy 2 above because more than 15% of suitable habitat would be converted to unsuitable habitat in 10 years in order to treat 4975 acres of 8606 acres of suitable habitat within 0.5 miles of private land. Some of these private lands do not have any structures; so destruction of property is less likely. Strategy suggests treating 175 acres of suitable habitat plus 4800 acres of the suitable habitat WUI 3% exemption (4975 acres total) in order to address 0.5 mile buffer around most private lands.

Since recommendation stays below 30% unsuitable, can still accomplish PCT of any age class (1%) until management reaches 15% in 10 years. At 15% unsuitable in 10 years, the thinning cannot be extensive enough to convert the stand to unsuitable (≤25% tree cover). If the thinning does convert additional stands to unsuitable condition, then this PCT will occur in CWPP or HFRA WUI and use the 3% WUI

exemption. Surrounding 3 LAUs are already over 30% unsuitable; so, strategy keeps this LAU below 30% unsuitable in order to keep the 3% WUI exemption.

Hog Park - Recommendation does not meet strategies 1 or 2 above. More than 30% of the lynx habitat will be in unsuitable condition and more than 15% of suitable habitat would be converted to unsuitable habitat in 10 years in order to treat 2131 acres within 0.5 miles of private land and treat 1969 acres of suitable habitat within the Cheyenne Board of Public Utilities (CBPU) identified watershed of concern. Strategy suggests treating 3100 acres of suitable habitat plus 1000 acres of the suitable habitat WUI 3% exemption (4100 acres total) in order to address 0.5 mile buffer around private lands and CBPU watershed of concern.

Can accomplish PCT of any age class (1%) until LAU reaches 15% unsuitable in 10 years or 30% unsuitable. If either threshold is reached, can still accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption. If the 15% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) would occur in stands where crown lift is $\geq$ 10 ft and thinning is not extensive enough to convert the stands to unsuitable condition ($\leq$25% tree cover) or total tree height $\leq$ 6 ft. Stands with tree height $\leq$ 6 ft. are already unsuitable. If the 30% threshold is reached, other PCT outside CWPP or HFRA defined WUI (remainder of 1%) would occur only in stands that do not yet provide winter hare habitat.

Blackhall Mtn – Most of this LAU occurs in Wyoming. Recommendation meets strategy 2 above. More than 30% of the lynx habitat is in an unsuitable condition due to the pine beetle outbreak so strategy 1 cannot be met. However, past vegetation management did not convert >15% of suitable habitat to an unsuitable condition in 10 years, so strategy 2 will be met. Strategy converts 532 acres of suitable habitat within 0.5 miles of private land to unsuitable condition with the 3% WUI exemption.

PCT outside CWPP or HFRA defined WUI (1%) can occur in stands where crown lift $\geq$ 10 ft and thinning is not extensive enough to convert the stands to unsuitable condition (<25% tree cover) or total tree height is $\leq$ 6 ft. Stands with tree height $\leq$ 6 ft. are already unsuitable. Can accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption.

Little Snake – Only a small portion of this LAU occurs in Wyoming. Recommendation meets strategy 2 above. More than 30% of the lynx habitat is in an unsuitable condition due to the pine beetle outbreak so strategy 1 cannot be met. However, past vegetation management did not convert >15% of suitable habitat to an unsuitable condition in 10 years, so strategy 2 will be met. Strategy converts 26 acres of suitable habitat within 0.5 miles of private land to unsuitable condition with the 3% WUI exemption.

PCT outside CWPP or HFRA defined WUI (1%) can occur in stands where crown lift $\geq$ 10 ft and thinning is not extensive enough to convert the stands to unsuitable condition (<25% tree cover) or total tree height is $\leq$ 6 ft. Stands with tree height $\leq$ 6 ft. are already unsuitable. Can accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption.

Diamond Park – Only a small portion of this LAU occurs in Wyoming. Recommendation meets strategy 2 above. More than 30% of the lynx habitat is in an unsuitable condition due to the pine beetle outbreak so strategy 1 cannot be met. However, past vegetation management did not convert >15% of suitable habitat to an unsuitable condition in 10 years, so strategy 2 will be met. Strategy converts 83 acres of suitable habitat within 0.5 miles of private land to unsuitable condition with the 3% WUI exemption.

PCT outside CWPP or HFRA defined WUI (1%) can occur in stands where crown lift $\geq$ 10 ft and thinning is not extensive enough to convert the stands to unsuitable condition (<25% tree cover) or total tree height is $\leq$ 6 ft. Stands with tree height $\leq$ 6 ft. are already unsuitable. Can accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption.

Red Elephant Mtn – Only a small portion of this LAU occurs in Wyoming, <300 acres. Recommendation meets strategy 2 above. More than 30% of the lynx habitat is in an unsuitable condition due to the pine beetle outbreak so strategy 1 cannot be met. However, past vegetation management did not convert >15% of suitable habitat to an unsuitable condition in 10 years, so strategy 2 will be met. Strategy would convert 0 acres of suitable habitat to unsuitable condition since there is no WUI in this LAU in Wyoming.

PCT outside CWPP or HFRA defined WUI (1%) can occur in stands where crown lift $\geq$ 10 ft and thinning is not extensive enough to convert the stands to unsuitable condition (<25% tree cover) or total tree height is $\leq$ 6 ft. Stands with tree height $\leq$ 6 ft. are already unsuitable. Can accomplish PCT of any age class in CWPP or HFRA defined WUI while using the 3% WUI exemption.